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FOURTH-GRADE STUDENTS' READING COMPREHENSION
OF INDEFINITE TIME TERMS IN
SOCIAL STUDIES CONTENT

by

(C)

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF EDUCATION

DEPARTMENT OF ELEMENTARY EDUCATION

EDMONTON, ALBERTA

FALL, 1976

a) birthdate in ABSTRACT an age of 9 to 10 years,
b) verbal and nonverbal I.Q. measured by the
The purpose of this study was to examine fourth-grade students' reading comprehension of selected indefinite time terms presented in social studies content. The investigation considered understanding of 15 frequently used indefinite time terms in the presence of definite time terms of similar meaning and in reading contexts varying in time and experiential emphasis. The 75-item multiple-choice Indefinite Time Term (ITT) Test was constructed to assess students' ability to select two meanings, indefinite and definite, for each indefinite time term. A definite time term was provided within each test item stem to focus and clarify meaning of each indefinite term tested. Student understanding of the 15 indefinite time terms was examined in sets of five items testing each term and in sets of 15 items testing each term once in five different reading contexts. The influence of intelligence, reading ability and sex upon students' reading comprehension of indefinite time terms was also examined.

A sample of 201 fourth-grade students was administered the ITT Test in two parts by 12 classroom teachers. The students, from three middle-class elementary schools in the Edmonton Public School System, were selected according to the following information available in cumulative record files:

were found to be:
a) birthdate indicating an age of 9 to 10 years,
b) verbal and nonverbal I.Q. measured by the ~~was~~
not.

Canadian Lorge-Thorndike Intelligence Test,

ProForm 1, Level A, of this study fourth-grade

students. c) Word and Paragraph Meaning percentiles on the ~~hand~~ Stanford Achievement Test, Form X, Intermediate
~~in independent~~ level 1.

Statistical analyses of student performance to test hypotheses included a custom test item analysis and Pearson's product-moment coefficient of correlation.

The findings of the study indicated that the majority of students were unable to select both correct indefinite and definite meanings, one in the presence of the other, for nearly half or more of the test items.

Students were more able to choose a correct definite meaning than a correct indefinite response. They were, however, more able to select an indefinite meaning before choosing both indefinite and definite meanings for an indefinite time term.

Understanding of indefinite time terms was not found to be consistent with possible frequency of those time references in social studies materials. Comprehension was, however, influenced more by the remoteness of the reading context from the present than the direct or vicarious experiential aspect. While verbal and nonverbal intelligence and knowledge of word and paragraph meaning

were found to be significantly related to students' reading comprehension of indefinite time terms, sex was not.

From the findings of this study fourth-grade students, as a group, are likely to be unable to comprehend indefinite time expressions frequently encountered in independent reading of social studies reference materials. Further research in this area involving group or individual study would be desirable. Greater consideration might also be given to the developmental sequence of understanding an indefinite time term suggested from results of the present investigation.

ACKNOWLEDGEMENTS

The writer wishes to express her gratitude and indebtedness to the following people:

Dr. Jean E. Robertson, who as Supervisor, provided invaluable guidance and assistance throughout the study.

Dr. M. Patricia Browne and Dr. Jay Bishop who served as committee members and gave helpful suggestions.

Dr. S. Hunka and Mr. T. Craig Montgomerie of Educational Research Services who assisted with statistical aspects of the investigation.

Olga Bojechko, Jane Calder and Donna Wyatt, former teaching colleagues, and Judy Craig, Greg Mireau, Jean Penner and Myrtle Pruden, fellow graduate students, who gave reactions and suggestions during the construction of the test instrument.

The administrators, teachers and students of the five Edmonton Public schools whose cooperation and participation made this research possible.

My husband, Lyell, whose support and encouragement were a continual source of strength and reassurance.

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Chapter 1

THE PROBLEM: ITS NATURE AND SIGNIFICANCE

Introduction to the Problem

Reading social studies materials is one of the many activities children engage in to acquire social studies concepts and generalizations (Arnsdorf, 1962). In the fourth grade students experience the increasing need to read social studies reference materials independent of reading instruction (Gray, 1963). The extent to which a student understands as he reads is partially dependent upon his knowledge of vocabulary used in these social studies reference materials.

A cursory examination of ten consecutive pages in each of the beginning, middle and end sections of three reference materials judged by the researcher, from classroom teaching experience, to be appropriate in content and readability for use in the study of social studies topics recommended for grade four students in the Province of Alberta revealed frequent usage of indefinite time terms (Appendix A). That is, indefinite time terms were used on the average of more than two per page. Research studies (Gill, 1962; Walker, 1968; Wesley & Wronski, 1958) have shown that elementary school students, as well as students in higher grades and college levels, have difficulty in

understanding indefinite time terms in written materials. Among elementary school students those in fourth grade have been found by one researcher to be lacking in understanding of indefinite time terms (Friedman, 1944).

Fourth-grade students in Alberta, therefore, must read independently of teachers social studies reference materials containing indefinite time terms which research has found to be difficult for them. To expect them to comprehend the materials presented without a clear understanding of the vocabulary used and perhaps without teacher awareness of the level of understanding and nature of their comprehension difficulty is regrettable.

The Problem

Research provides little insight concerning either the level or nature of understanding experienced by fourth-grade students in their comprehension of reading materials containing indefinite time terms. Friedman (1944) administered a written test, one section of which consisted of multiple-choice items, by which he attempted to ascertain the understanding of students in grades four, five and six concerning indefinite time concepts. All questions in this section required students to choose one answer from four possible choices all using indefinite terms, two each of past and future. His findings indicated greater logic in a child's thinking of time concerning the past than the future. The investigator

concluded, however, that the indefinite time expressions frequently used by others working with young children must be used with the appreciation "that to children their meanings are greatly varied and often are inaccurate and vague" (p. 342).

Much of the research considered both indefinite and definite time terms by asking students to express the meaning of indefinite time terms in definite time terms or vice versa. Students were not given the opportunity, however, to indicate their understanding of indefinite time terms in both definite and indefinite terms in a test task. Assessment of student understanding of an indefinite time term may be more adequate and complete if the indefinite term is given in the presence of a suitable, equivalent definite time term and students are then provided with the opportunity to indicate their understanding of the indefinite term in both indefinite and definite meanings.

In an attempt to find out whether students in grades four, five and six preferred definite or indefinite expressions in placing stories in time and whether the preferences changed with age, Kelty (1925) asked 1,102 students from an urban school system to select either an indefinite or definite time term in a sentence completion task. Her findings indicated that the preference of students in grades four, five and six for definite time

terms increased from grades four to six with the greater percentage increase between grades four and five. However, a substantial majority, 2/3 of the students tested, still preferred indefinite time terms even in grade six. The study did not explore how students may use the definite time terms to develop understanding of the indefinite time terms or vice versa.

Research by Jarolimek and Foster (1959) further substantiated both Friedman's findings indicating difficulty in comprehending indefinite time terms and a statement by Schlindler, Spieseke, Bard, Darrin and Schmuck (1953) in an article on the development of sense of time and chronology suggesting indefinite time terms were more difficult for children to comprehend than definite ones. Jarolimek and Foster used a multiple-choice test of 48 items in an attempt to investigate children's understanding of quantitative concepts or phrases, terms or words concerned with measuring, estimating or enumerating that they find in their reading. They found that fifth-grade students misunderstood 39% of the test items which employed only definite time terms and 62% of those items using only indefinite time terms. Kelty's research results suggesting preference for indefinite time terms found by other researchers to be more difficult to understand than definite ones, may perhaps partially be explained by children's familiarity with indefinite time

terms which are used in children's literature. Arnsdorf (1963) found that 78.5% of the time terms used in a random sample of 25 social studies textbooks for elementary schools were indefinite while 21.5% were definite time terms. In Jarolimek and Foster's research, too, no information was sought which might give insight into how indefinite and definite time term meanings develop one with the other.

The limited amount of research focusing upon reading comprehension of indefinite time terms by students in grades four, five and six has shown that students in those grades have difficulty comprehending indefinite time terms and although there is increasing preference for definite time terms, the majority still prefer time stated indefinitely. Consideration of the above findings and the absence of research allowing students to indicate their understanding of indefinite time terms in both definite and indefinite expressions suggested the need for giving students the chance to express their comprehension of indefinite time terms in both indefinite and definite responses. Such an opportunity may reflect how students use both definite and indefinite terms to express their understanding of indefinite time terms.

The Purpose of the Study

The purpose of this study was to investigate fourth-grade students' reading comprehension of indefinite time terms by asking them to select two meanings, indefinite and definite, for any one indefinite term presented in social studies material. The presentation was such that the meaning of the indefinite time term was expressed in a definite term in context.

Definition of Terms

In this study terms were defined as follows:

Indefinite time terms were words and/or phrases which by themselves did not stand for an exact, objective measurement of time. They depended upon context to relay meaning.

The 15 indefinite time terms tested in this study were:

as	after	old
when	before	during
new	today	early
then	soon	until
now	still	later

Phrases such as "a few years ago" and "several months ago" were used in the multiple-choice test item answer options.

Definite time terms were words, phrases and/or

numbers which meant an exact time or date. They did not depend upon their use in context to relay meaning. Examples are, "January 1, 1975," "December, 1968," "1950," "four years ago" and "six months ago."

Reading comprehension of an indefinite time term was the ability to make a dual-selection of both correct definite and indefinite meanings for the indefinite time term used in the stem of the test item.

Fourth-grade students were children in the last two months of their fourth year in school or in the first two months of their fifth year of school.

Indefinite Time Term (ITT) Test was a 75-item multiple-choice test constructed for this study to assess fourth-grade students' level and nature of understanding in comprehending 15 selected written indefinite time terms. The 15 selected terms were used in social studies content in the following five different test item contexts:

- A. Vicarious experience before the subject's lifetime,
- B. Vicarious experience within the subject's lifetime but not within the last calendar year,
- C. Direct experience within the subject's lifetime but not within the last calendar year,
- D. Vicarious experience within the last calendar

year of the subject's lifetime,

E. Direct experience within the last calendar year of the subject's lifetime.

Direct experience referred to an event or happening personally lived through or actively participated in by a student who was administered the ITT Test, e.g. learning to read, Hallowe'en festivities.

Vicarious experience referred to an event or happening not known through personal, active participation by a student who was administered the ITT Test, e.g. discovery of oil in Alberta, first lunar landing, Team Canada loss to Soviet hockey team.

Questions to be Answered

1. What is the level of reading understanding by fourth-grade students of 15 indefinite time terms?
2. What is the nature of reading understanding by fourth-grade students of 15 indefinite time terms?
3. Is there a relationship between the level of reading understanding of 15 indefinite time terms by fourth-grade students and their:
 - a) general reading achievement,
 - b) intelligence,
 - c) sex?

Hypotheses

1. There is no adequate level of reading understanding by fourth-grade students (i.e. 50% or more) of 15 indefinite time terms presented in multiple-choice test items. That is, their correct answer choices will number less than 36 of the 75 test items (i.e. 48%) of any or all of:
 - a) both correct indefinite and definite meanings,
 - b) the correct indefinite meaning,
 - c) the correct definite meaning.
2. Total performance of all students on any set of five items that tests each indefinite time term will not differ by more than two. That is, the number of their correct answer choices on the five items testing one of the 15 indefinite time terms will not differ from any other five items testing one of the other 14 indefinite time terms by more than 40% as indicated by any or all of:
 - a) both correct indefinite and definite meanings,
 - b) the correct indefinite meaning,
 - c) the correct definite meaning.
3. Total performance of all students on any set of 15 items that tests each indefinite time term once in each of the five reading contexts will not differ by more than six correct out of 15. That is, the number of their correct answer choices for 15 indefinite time

terms tested in one of the following reading contexts:

- A. Vicarious experience before the subject's lifetime,
- B. Vicarious experience within the subject's lifetime but not within the last calendar year,
- C. Direct experience within the subject's lifetime but not within the last calendar year,
- D. Vicarious experience within the last calendar year of the subject's lifetime,
- E. Direct experience within the last calendar year of the subject's lifetime

will not differ from any indefinite time terms tested in the other four reading contexts by more than 40% as indicated by any or all of:

- a) both correct indefinite and definite meanings,
- b) the correct indefinite meaning,
- c) the correct definite meaning.

4. There is no significant correlation between the reading comprehension of 15 indefinite time terms by fourth-grade students as indicated by their total raw score on the ITT Test and any of the following variables:

- a) their percentile placement on the Word Meaning section of the Stanford Achievement Test, Form X, Intermediate 1,
- b) their percentile placement on the Paragraph

Meaning section of the Stanford Achievement Test, Form X, Intermediate 1,

- c) their verbal I.Q. score on the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level A,
- d) their nonverbal I.Q. score on the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level A,
- e) their sex.

The Experimental Setting

The investigation of grade four students' reading comprehension of indefinite time terms in social studies content was conducted in a series of steps. Following a review of research and literature to obtain knowledge of fourth-grade students' understanding of indefinite time terms in reading materials, an examination of the recommended social studies topics for grade four students in the Province of Alberta and reference materials used to study those topics was undertaken. A frequency count of indefinite time terms in the reference materials was made.

Fifteen indefinite time terms were then selected to be used five times each in five different reading contexts. To provide distractors for the test item answer choices, a random sample of 25 fourth-grade students within the Edmonton Public School System was asked to define the 15 selected indefinite time terms presented

in test item stems. A pilot study with 39 students in grade four selected from those in one school was conducted to examine the suitability of format and test item content of the ITT Test.

The ITT Test was then administered to a sample of 201 fourth-grade students within the Edmonton Public School System to assess their level and nature of understanding of indefinite time terms. Statistical analyses to test hypotheses included a custom test item analysis, a correlation reliability program and Pearson's product-moment coefficient of correlation.

Assumptions

The following assumptions were made:

1. The level of reading understanding of 15 selected indefinite time terms by fourth-grade students can be measured by the ITT Test which consists of multiple-choice items requiring a dual-choice of correct indefinite and definite meanings.
2. Five aspects of the nature of reading understanding of 15 selected indefinite time terms by fourth-grade students can be ascertained through use of those terms in five different reading contexts.
3. The 15 selected terms are representative of

those indefinite time terms found in fourth-grade social studies materials used in Alberta.

Limitations

The findings of this study are limited to the following:

1. Fifteen indefinite time terms presented in social studies content in multiple-choice test items.
2. Application to fourth-grade students of similar experience and social studies background.

Significance of the Study

This study could give greater insight to classroom teachers regarding the level and nature of understanding experienced by fourth-grade students in comprehending written indefinite time terms in addition to the provision of an instrument which may be utilized in format and altered in content. Awareness of the burden indefinite time terms may place on comprehensibility of written material and knowledge of one assessment format might prompt teachers to assess student comprehension of indefinite time terms and provide instruction designed to increase understanding of indefinite expressions of time in written materials.

Writers of reading materials for use in the fourth grade and those responsible for selection of written materials to be used in the classroom may become more aware of the difficulty indefinite time terms might impose upon reading comprehension. Writers might be alerted to provide additional cues to the meaning of indefinite time terms in particular contexts. One criterion for selection of classroom reading materials in the future might be the frequency and method of presentation of indefinite time terms.

Those responsible for teacher preparation might realize the importance of stressing that reading instruction ought to be part of all subject areas and that teachers can not assume vocabulary to be understood equally in different contexts.

Summary and Outline of the Report

The present chapter stated the problem and purpose of the study. Definition of terms, questions and hypotheses to be researched and the experimental setting of the research study were provided. The assumptions, limitations and significance of the study were also discussed. In chapter 2, research related to the present study was reviewed. Chapter 3 described in detail the development of the test instrument while the experimental design of the study, including piloting of the ITT Test, was

related in chapter 4. Statistical analyses of student performance and the findings of the study were stated in chapter 5. The summary of the current research given in chapter 6 was presented with conclusions, implications and suggestions for further study.

Chapter 2

A REVIEW OF RELATED LITERATURE

The following review of related research will be organized around three central considerations to the problem of this study. The first section will review research studies concerned with indefinite time terms. A review of those studies that have examined the development of time concepts within the direct experiences of the child will follow. Finally, studies that have investigated the child's development of time concepts outside his direct experiences will be considered.

Studies Related to Interpretation of Indefinite Time Expressions

One of the earliest attempts to investigate children's responses to time expressions was a subtest used by Kelty (1925) in the study referred to in chapter 1. Kelty asked 1,102 students in grades four, five and six in a city school system whether they preferred stories that happened "long, long ago" or "in the thirteenth century." Three questions of this type were presented and an analysis of the exercise results indicated a steady increase in their preference for definite time expressions from grade to grade but even at the sixth-grade level, a substantial majority still preferred the

indefinite phrases. The small number of items and the nature of the two-choice task cause little significance to be attributed to Kelty's findings other than focusing attention on both indefinite and definite references to time. The present study considered preference by giving students the opportunity to express their understanding of an indefinite time term in both definite and indefinite responses, one in the presence of the other.

Part of the study by Friedman (1944), also mentioned in chapter 1, was concerned with the logic of children's thinking in understanding indefinite time terms. Approximately 300 grade four, five and six students in three elementary schools were presented with 12 events, for each of which they were asked to select one of the following time responses: "a long time ago," "a short time ago," "a short time to come" and "a long time to come."

While 44% of the students indicated "last summer" to have occurred a long time ago, 52% of the students said that "Bible times" occurred a long time ago. A greater number, 93%, placed George Washington's life in that category. Even less logic was evident in student responses to events in the future than those concerning the past. The majority of students, 52%, responded to "tomorrow" as being "a long time to come." The beginning of senior high school was considered more frequently to

be "a long time to come" than was reaching adulthood. This portion of Friedman's study revealed the varying interpretation that children could indicate for indefinite time expressions and further stressed the teacher's need to assess understanding of those expressions.

Studies (Gabel, 1940; Gill, 1962; Wesley, 1942; Wesley & Wronski, 1958) have shown that students in higher grades and college levels also experience difficulty in understanding such expressions of time. As there is an apparent need for improved comprehension of time expressed indefinitely at all levels, the current study considered the assessment of level and nature of understanding of indefinite time terms at an early grade level, grade four, where students face an increasing need to independently read materials containing indefinite time references.

Wesley (1942) constructed and gave a test consisting of 18 indefinite time phrases. The 31 high school and 31 college and graduate students, 30 of whom had had teaching experience, were directed to respond to each phrase with a specific date. Student responses to each item were tabulated according to the earliest, median and latest date given. For example, the phrase "a long time ago" elicited date responses from the college students that ranged from 10,000 B.C. to 1850, with a median date of 1500 from the high school students.

Although the results appeared to indicate that time phrases of an indefinite nature were interpreted loosely, the college students demonstrated a better understanding of the past in terms of greater comprehension of length of time passed and more flexibility in thought from the past to the present.

A later study by Wesley and Wronski (1958) further confirmed Wesley's earlier findings. They administered the same test to a larger sample of 204 high school and 233 college and graduate students. Student responses analyzed in the same manner also revealed greater understanding of the indefinite time phrases by the college group, however, the authors stated that time expressions such as "in the past," "centuries ago" and "soon" were found by both high school and college students to be difficult to interpret when asked to assign specific dates.

A similar study was conducted by Gill (1962) in an attempt to investigate whether there were significant differences among various grade levels in the interpretation of indefinite time expressions commonly found in social studies textbooks. Influenced by Wesley's earlier research, Gill constructed a test which required students to state a definite date for each of 18 indefinite time phrases. Gill gave the test to a random sample of 68 college students, 56 grade eleven and twelve students,

68 grade eight students and 62 fifth-grade students.

The range and median of dates given indicated that the indefinite time expressions were loosely interpreted at all grade levels but the higher grade levels, particularly the college level, displayed a more superior grasp of their meaning. For example, the following percentage of students stated definite dates outside the 1700's for the phrase "in the late eighteenth century": fifth grade, 48%; eighth grade, 23%; eleventh and twelfth grades, 28%; college, 3%. The current study included a definite time expression within the stem of each test item to provide a more accurate meaning for indefinite time terms which researchers have found to be loosely interpreted.

In a study designed to compare the effect on reading comprehension and retention of presenting quantitative terms definitely or indefinitely, Gabel (1940) prepared six one-page selections of social studies content, each containing 40 quantitative terms pertaining to time, area, distance and size. Two forms of each selection were prepared, identical except for the quantitative terms expressed definitely in one and indefinitely in the other. Two forms of a multiple-choice test were used to test the comprehension and retention of the terms used in the selections. The questions on both forms of the test were alike except the answer choices on one form were stated definitely while those on the other were

stated indefinitely. Some of the 1,627 students from grades six, eight, ten and twelve read the definite forms of the selections and some read the indefinite forms. All responded to both forms of the test.

The multiple-choice test format of the present study differed from that of Gabel by giving students the opportunity to read a short passage containing both indefinite and definite time terms, that is, a normal usage of both types of time references, not excluding one or the other. Students indicated their comprehension of the underlined indefinite time terms in both indefinite and definite meanings.

Analysis of Gabel's results indicated significant differences, at the .01 level of confidence, between the group scores of the students who had read the definite selection forms and the group scores of those who had read the indefinite selection forms. These differences, in favor of the definite forms, were evident for all grades and types of quantitative terms, considered both as a whole or separately.

Jarolimek and Foster (1959) also investigated reading understanding of quantitative terms or references concerned with measuring, estimating or enumerating found in social studies material. They examined three grade five social studies textbooks, judged by the researchers to be widely used, for kinds of quantitative concepts

found and frequency of their occurrence. The quantitative concepts encountered were classified in the following six categories: definite and indefinite references to objects, space and time. The researchers devised a multiple-choice test of 48 items which was administered to approximately 500 fifth-grade students. Test items were selected from consecutive lines of text from the three books previously examined. Eight items were prepared for each of the six categories of quantitative concepts. The stems of the test items were direct quotations from the three texts and the vocabulary in the five options was judged by the researchers to conform to or to be less difficult than that of the textbook quotations.

The analysis of test results focused on the responses of 227 students who had grade placement scores in reading of 5.0 or above and whose I.Q.'s were recorded as 90 or higher. These students obtained the lowest percentage of incorrect responses on questions relating to definite references to time (39%) while obtaining the highest percentage of incorrect responses on questions relating to indefinite references to time (62%). References to space or objects, definite or indefinite, were more difficult than definite references to time but less difficult than time references stated in indefinite terms.

The authors cautioned the conclusiveness of their

findings as they were based upon only eight items per quantitative concept tested. They suggested, however, that if students are left unguided in their reading of passages that contain indefinite and definite quantitative concepts of objects, space and time, a teacher "may expect children who are average or better in intellectual capacity and reading ability, as a group, to understand only about half the number of concepts they encounter in their social studies textbooks. Children who read below grade level or those who are below average in intellectual capacity may, as a group, be expected to understand less than a third of the concepts" (p. 44).

The present research also involved an examination of three social studies references and the development of a multiple-choice test, however, consideration was limited to an indepth study of only one aspect, the indefinite references to time. Test items were original compositions with a level of readability and social studies content appropriate for the fourth-grade students of the study sample.

In another study to determine whether the definiteness or indefiniteness of temporal and spatial terms affected students' reading comprehension, Arnsdorf (1967) used three classes from each of grades four, five and six. Two reading passages from basal social studies textbooks were prepared in two forms. Form A was an

exact reproduction of the textbook selection while Form B was rewritten, replacing indefinite time and space expressions with definite terms. The two forms were randomly distributed for students to read and study. Student responses to open-ended questions on the content and vocabulary of the selections were analyzed.

Arnsdorf found that although in five of six comparisons made, students reading the adjusted selections with definite temporal and spatial vocabulary scored higher than those who had read the verbatim textbook passage, differences between mean scores resulting from form of materials read were not significant.

A multiple-choice test design was chosen for the current study to provide an objective instrument to assess student understanding independent of ability of expression in written form as required by the open-ended format employed in the above study.

Finally, a study by Walker (1968) revealed that grade seven students' reading comprehension of social studies material containing time concepts was significantly influenced by the definiteness or indefiniteness of the form of the time expressions. He found that indefinite time expressions reduced the comprehensibility of the reading material compared with definite expressions of time.

Two forms of a passage of an historical nature

were written and prepared as cloze tests. One form contained time concepts stated in definite terms, the other in indefinite terms. The 312 students were administered the cloze tests in two administrations separated by a 7-week interval.

Walker found that comprehension of time concepts expressed in definite terms was greater than if those concepts were expressed in indefinite terms. He further found that verbal and nonverbal I.Q. measures and vocabulary and paragraph comprehension test scores were significantly related to the cloze test scores. Sex, however, was shown to relate insignificantly to the test scores on both forms. To further consider these findings, possible relationships between comprehension of indefinite time terms and verbal and nonverbal I.Q., word and paragraph meaning percentiles and sex were included in the present study.

Summary

The research findings of Friedman (1944), Wesley (1942), Wesley and Wronski (1958) and Gill (1962) related to reading comprehension of indefinite time terms revealed the difficulty students from grade four to senior college levels experience in interpretation of those time expressions. The current study attempted to provide greater knowledge and awareness of this difficulty by assessing the level and nature of understanding of

indefinite time terms at the earliest level of fourth grade.

The multiple-choice test used by Jarolimek and Foster (1959) and the desire to utilize an objective test instrument to assess students' understanding of indefinite time terms independent of their written expression to open-ended questions as required by Arnsdorf (1967) resulted in the decision to design and use a multiple-choice test format in the current study.

The findings of Kelty (1925) indicating student preference for indefinite rather than definite references even at the grade six level and of Gabel (1940) suggesting greater understanding and retention of passages containing quantitative terms presented definitely rather than indefinitely were considered in the present study. Definite time expressions were included within the stem of each test item to give a more accurate meaning for the indefinite time term tested. The answer options allowed students to express their understanding in both definite and indefinite terms. The factors of verbal and non-verbal I.Q., vocabulary and paragraph comprehension found by Walker (1968) to be significantly related to scores on cloze tests were again considered in the current study. Sex, although found to be insignificantly related by Walker, was also examined in the present study.

Studies of the Development of Time
Concepts within the Direct
Experience of the Child

Studies Using Verbal Testing Devices
to Assess Children's Development of
Time Concepts

One of the earliest studies undertaken to examine the development of children's knowledge of time was conducted in England by Oakden and Sturt (1922). Eight separate time concept tests were given to varying numbers of children between the ages of 4 and 13 years. One test was concerned with time words used in everyday life. The test was administered orally to 54 children aged 4 to 7 and as a written group test to 56 children aged 8 to 10 years.

Results indicated continuous development of meaning of time words of ordinary use after 4 years of age. The authors noted a tendency for growth of a time concept according to the frequency of its recurrence. For example, morning and afternoon were known before the days of the week and the days of the week before the month and year. Personal interest appeared to affect the order of acquisition of the time concepts. The month of one's birthday, for instance, was learned early. The present study employed a written group test administered to students aged 9 to 10 years to measure their understanding of indefinite time terms chosen on the basis of their possible frequency of occurrence as indicated in chapter

3 and presented in both direct and vicarious experiential context.

Bradley's (1947) partial replication of Oakden and Sturt's study gave the present researcher some indication of the general nature of children's development of the concept of time. Four separate tests were given to samples of from 57 to 177 urban school children ranging in age from 5 to 13 years. A detailed "questions" test was given to measure understanding of everyday time words. Students aged 5 to 7 years took the oral test individually while those between 8 and 13 wrote it as a group test. Bradley also found that the time concepts known first were those with a personal reference such as the age of the student, distinction between morning and afternoon and knowledge of no school held on Saturday. Next in order of difficulty came the days of the week, followed by the names of the months. Bradley's results showed that 8-year-olds displayed general mastery of the vocabulary of time-names, 9-year-olds could "comprehend a long period of years" but it was not until age 12 or 13 that students could answer questions measuring time duration.

In a further investigation into the nature and development of time concepts of young children, Harrison (1934) constructed a 50-item test of unspecified but said to be common terms selected from vocabulary studies. The test was administered individually to 160 students

from kindergarten through third grade. Using a seven-point scale to ascertain the degree of comprehension of the time words, Harrison noted a continuous, steady increase, from grade to grade, in comprehension of those terms and a decrease in the number of responses revealing partial, confused or lack of comprehension.

Data analysis yielded a correlation of .66 between comprehension of time terms and grade placement, .70 between understanding and mental age and .58 between knowledge of the time terms and chronological age. Harrison interpreted these correlations to indicate that "concepts of time develop in closer agreement with inner maturation, as indicated by mental maturity, than with training and experience, as indicated by chronological age and grade placement" (p. 513). Correlation between understanding of indefinite time terms and intelligence was considered in the current study.

A statement by Harrison concerning the importance of precise shades of meaning in language development of time terms was found to be pertinent to the present study. Such terms as "before" and "after" used as examples, were found to confuse the child until more precise meanings were known and understood. For instance, the early acquired meaning of "behind" for the term "after" hinders his application of the term in the future tense. Both "before" and "after" were terms tested in the present

study.

Friedman (1944) devised and administered two tests to a total of 697 pupils from kindergarten to grade six. The first test, given orally to individual children from kindergarten to grade three, measured their understanding of conventional time terms. The second test, given to students in grades four to six, assessed their reading comprehension of a variety of time concepts as well as those items answered incorrectly by at least 90% of the primary students.

No kindergarten child knew what year it was, however, most third-grade children responded correctly to that question. Knowledge of the day of the week, the name of the month, the day of the month and the correct order of months was achieved at the average chronological age of 11 years.

Questions asking students to tell something that happened "a long time ago" and "a short time ago" and to indicate when the occurrence took place revealed most of the reasonable answers were based on the experiences of the children. Responses for "a short time ago" were more successful than those for "a long time ago." The present research attempted to assess the nature of grade four students' understanding of indefinite time terms by presenting each term in five different contexts stressing direct and/or vicarious experiences in time from within

the last calendar year to approximately 143 years beyond the students' lifetime.

The factors of sex and I.Q. were not found by Friedman to contribute significantly to success on the tests used in his study.

Ames (1946) conducted research in which she studied the time concepts of 95 children between the ages of 18 months and 8 years. Children of high average to very superior intelligence ranging in age from 18 to 48 months were observed through a one-way-vision screen over a period of 2 years. All spontaneous verbalizations involving time concepts were observed, recorded and analyzed. These children, together with another age group from 5 to 8 years, were asked questions related to time concepts. Analysis of the verbal data indicated marked individual differences of children's understanding of time concepts within any one level of age or intelligence. It appeared, however, that concepts were acquired and used in a definite order and at approximately the same time in the life of most children. Ames therefore suggested that a child's readiness to acquire and use time concepts depended chiefly upon maturational factors. This suggestion was contrary to Harrison's earlier findings of a higher correlation between mental age and the scores on her test than between the scores and chronological age. Possible correlation between intelligence and test scores

on the ITT Test for fourth-grade students of approximately the same chronological age was considered in the current research.

The first time words evident in spontaneous verbalizations were those that referred to the present like "now" and "today." These terms appeared near 2 years of age and were followed by such expressions as "gonna" and "in a minute" which referred to the future. Phrases such as "last night" and "last week" that referred to the past were observed at age 2 1/2 years. This trend of time words appearing first in the present, then the future and finally in the past tense was noted both in spontaneous speech and in answers to questions. By 3 1/2 years of age, an equal number of words denoting the present, future and past were used. Student understanding of indefinite time terms such as "now," "soon" and "after," denoting the present, future and past was assessed in the present study.

Another apparent trend was the tendency for young children to express time in terms of some personal, daily activity before they could answer using correct clock time. A 4-year-old child would reply that afternoon began "after lunch" whereas a 7-year-old boy would say it began after 12 o'clock. Likewise, specific time words were used before those of a general nature. For instance, the word "time" was first spoken as part of "lunchtime," "puzzle

time" or "night-time" prior to its use in phrases such as "when it's time" or "all the time."

Ames' study showed that a child's division of time begins by ability to distinguish between morning and afternoon at 4 years, knowing what day it is at 5 years, telling time, knowing the month and season at 7 years and giving the year and day of the month by 8 years of age. Children could name the days of the week correctly by 5 years of age but months of the year were not stated in perfect order until 8 years of age. Ames' findings further substantiated the appropriateness of utilizing the conventional time terms "week," "month" and "year" in test item answer options for the ITT Test.

In a more recent but limited study, McAulay (1961) measured understanding of time relationships of 165 second-grade children. These students together with 62 third-grade students used for comparison purposes, were asked questions orally and individually. The time concept questions were associated with the self, the immediate environment and removed or historical environment. McAulay concluded from comparisons of the scores of these categories that second-grade children tend to have a better understanding of the past than of the present, immediate time environment and that their understanding of the remote past is better than that of the immediate past. The children also seemed more able to understand

the relationship between themselves and past events more efficiently than with other people or places.

McAulay's conclusions did not support previous research findings related to this area of learning. Walker (1968) felt that a design weakness in McAulay's study might perhaps account for the discrepancy. Walker stated that the questions in the historical time category could possibly have been answered from general knowledge without the time elements involved being properly comprehended. This, he felt, would not permit the three sections of the test to be considered of comparable difficulty in all respects other than the time concepts involved. The definite time term included within the stem of each test item in the current research attempted to provide test items of comparable difficulty in all respects other than the direct or vicarious experience and time concept inherent in each test item.

Children's understanding of time relations was further examined by Farrell (1953) in a study using 75 children of high I.Q. aged 5, 6 and 7 years. She administered a question-type test divided into two sections, one concerned with present time and the other with past and future. Each question required a factual answer as well as a verbal explanation for the answer given.

Analysis of factual answers showed that questions concerned with personal, immediate time concepts were

better answered and understood at a lower chronological and mental age than were those that involved remote time concepts. For example, all of the children answered questions correctly regarding their age, age next birthday and the time when they went home from school, however, less than half knew how long it would be until Christmas or the length of time they spent in school daily. Although this conclusion is similar to those of other studies previously cited, Farrell's two examples of remote time questions have an aspect of time duration found by other researchers to be difficult for children to understand. Unfortunately, she does not report other remote time questions used in her study.

Although no significant differences in test scores due to sex were evident, a significant relationship between mental age and scores was found except for those two groups having the highest mental age. Farrell stressed the possibility of test inadequacy in measuring upper mental age levels.

The cues used by children in formulating their answers were influenced by chronological and mental age but not by sex. The younger children utilized less independent cues, frequently stating they knew the answers because someone had told them or by not indicating how they came to the answer. The older children displayed growing independence in using cues such as referring to a

clock or a calendar or using known sequential arrangements to solve a time problem. In the present study, definite time terms were used as cues to give more precise meaning to the indefinite time terms used in the test item stems.

Bromberg (1938) examined the meaning of time of a small number of children of different chronological and mental ages. Using an informal, questioning technique, he found that children first understood time through concrete objects and their life experiences such as the numbers on the clock or daily occurrences. Gradually with increasing age, these concrete references were replaced by time viewed as an abstract concept. He stated that the development of a sense of time does not occur until after the age of 5 or 6 years and develops slowly until the age of 10 or 12 years. He concluded that although the age of maturation of the time concept depended upon intelligence, development of a sense of time seemed to occur at the same relative time in the life of every child. The assessment of student understanding of indefinite time terms at one grade level as considered in the current research was an attempt to measure the understanding of children of approximately the same chronological age. The possible relationship of intelligence to that understanding was also considered.

Newman (1967) constructed a battery of tests to study factors influencing elementary school students'

understanding of time duration and the stages by which such time concepts are acquired. The test battery, comprised of three tests measuring understanding of verbal comparisons of duration, understanding of graphic comparisons of duration and ability to use measures of duration, was administered individually to 192 students in grades one to six. The scores of these tests were correlated with factors of intelligence, chronological age, grade placement, sex and socio-economic status. Intelligence, chronological age and grade placement were found to be significantly related to test scores. No significant relationship was evident between sex and the scores of the tests but a low, significant correlation between socio-economic status as measured by the Blishen Occupational Class Scale and test performance existed. Third-grade children were found to understand comparisons of duration whereas measures of duration were first used satisfactorily by fourth-grade students. Newman's finding of the ability of grade four students to satisfactorily understand and use measures of time duration further strengthened the appropriateness of employing fourth-grade students in the present study to assess level and nature of understanding of indefinite time terms used in context both near and remote in time to the students' lifetime.

Summary

Oakden and Sturt (1922) found a relationship between the growth of time concepts and the frequency of their recurrence. Time concepts first known were found by Oakden and Sturt (1922) and Bradley (1947) to reflect personal references. Reasonable answers to time questions asked by Friedman (1944) were based on the students' experiences. Farrell's study (1953) revealed that temporal questions of a personal, immediate nature were better understood and answered at a lower chronological and mental age than were those of a less personal, more remote focus. Indefinite time terms used in the current study were chosen on the basis of their possible frequency of occurrence and were presented in both direct and vicarious experiential context to assess the nature of students' comprehension of those terms. In attempting to correct the possible design weakness noted by Walker (1968) in McAulay's (1961) research using uncomparable test sections, a definite time term was included in the stem of each test item in the present research to provide test items comparable in difficulty in respects other than the time concept or direct or vicarious experience involved.

Several studies (Ames, 1946; Bradley, 1947; Bromberg, 1938; Farrell, 1953; Friedman, 1944; Newman, 1967) indicated to the present researcher knowledge

regarding the development of time concepts and the appropriateness of using such time units as "week," "month" and "year" in the test item answer choices. The administration of the ITT Test to grade four students aged 9 to 10 years was also based upon children's understanding of those terms as found by the above studies.

Lack of consensus between related research considering the relationship, if any, between the development of time concepts and intelligence, prompted the possible correlation between test scores on the ITT Test and I.Q. to be considered in the present study. Ames' finding suggesting that the acquisition and use of time concepts was chiefly dependent upon maturational factors was not in agreement with those findings of Harrison (1934) indicating a closer relationship between inner or mental maturation than with training and experience as indicated by chronological age or grade placement. Bromberg viewed the conceptual development of time as being dependent on intelligence yet occurring at the same relative time in every child's life. While Farrell and Newman both found a significant correlation between intelligence and scores on tests used in their studies, Friedman did not.

Although sex was not found to be significantly related to the attainment of temporal concepts (Farrell, 1953; Friedman, 1944; Newman, 1967), that factor was included in the present research study to determine

whether a possible correlation might exist within a narrow age range at one grade level.

Studies Using Nonverbal Testing Devices to Assess Children's Development of Time Concepts

Piaget (1955) postulated that time as a logical concept has two aspects: the order of the succession of events and the duration of intervals separating successive events. He distinguished three stages in the child's development of the concept of time: the pre-language stage of sensori-motor intelligence; an intermediate, pre-operative stage between the ages of 2 to 7 or 8 years; and the stage of concrete operations which is attained at about 7 or 8 years of age.

Using dolls or toy cars made to move across a table at identical or different speeds, Piaget demonstrated that children at the preoperational stage were unable to comprehend time as both the ordering of events in sequence and the intervals or duration between those events. Difficulty in separating temporal and spatial priorities was evident when objects travelling at identical speeds were stopped at different times. Piaget concluded that the child's understanding of the simultaneity or successiveness in time depended upon the speed of the moving objects over the same path. Children of the preoperational stage could not separate their notion of time from that of speed and distance. Similar results

were observed in experiments using the flow of liquid.

Piaget found that although children varied in the order in which they grasped sequence or seriation and duration, both were mastered by children aged 7 or 8 years who were in the concrete stage of operations. He contended that the coordination of temporal succession and duration allowed the introduction of units of time measurement. The use of time units such as "weeks," "months" and "years" in the test item answer options was considered by the researcher to be appropriate for students in the present study who according to age, are in or beyond the concrete stage of operations.

Similar experiments to those carried out by Piaget were conducted in England by Lovell and Slater (1960). Their sample consisted of 50 students ranging in age from 5 to 9 years judged by teachers to be of average or above average attainment and 50 slow learners between the ages of 8 and 15 years. Many of Piaget's findings were substantiated but the researchers further emphasized the variability of children's concepts of time in different situations. The current study attempted to assess a student's understanding of an indefinite time term in five different reading contexts stressing direct and/or vicarious experiences both near and remote in time to the student's lifetime.

Studies Related to Children's Ability
to Understand Time Concepts in
Textbooks

Kelty (1925) compared children's knowledge of time expressions with what they were thought by textbook writers to understand. She examined a total of 100 primers and first-, second- and third-grade readers, recording and analyzing all definite, indefinite and comparative time expressions. Using selected items from these categories, Kelty devised a five-part test designed to assess fourth-, fifth- and sixth-grade students' comprehension of those references to time contained in primary readers.

Steady increases from grade to grade were apparent in the students' ability to select those expressions in a reading passage which denoted its temporal setting. This finding, not necessarily indicative of greater time awareness, might however be expected if general reading ability increased. This subtest did not separate students' time understanding from their reading capabilities. In an attempt to overcome this difficulty, the readability level of non-capitalized words used in the test items in the present study was controlled and teacher assistance was given to students regarding unknown capitalized vocabulary.

On another subtest, students were directed to arrange several series of time units in correct order according to length or sequence. Days of the week, the

seasons and the months of the year were well known. Little relationship between median test scores for individual time words and the frequency of occurrence of the same words in primary readers prompted Kelty to conclude that children's understanding of time words was gained more from general experience than by reading school texts. She further stated that authors underestimate the time concepts known by children.

Results of a subtest requiring subjects to select a time term to complete a sentence revealed lower median scores than those obtained on the subtest dealing with correct sequencing of time unit terms. Kelty interpreted this result by suggesting that children learn to visually recognize time terms before they are able to use them correctly in context.

Dobbs (1962) analyzed the introduction of time concepts in four social studies series, five elementary science series and eight elementary arithmetic series. Although she found both similarities and differences in the sequential presentation of time concepts at different grade levels, those concepts developed in social studies textbooks were not closely related in sequence to science and arithmetic texts. Dobbs' findings strengthened the need for the present study to determine the level of students' comprehension of indefinite time terms which are used frequently in social studies reference materials.

and therefore, are presumed by those writers to be understood.

Studies of the Development of Time
Concepts Outside the Direct
Experience of the Child

Studies Related to Children's
Development of Historical
Time Concepts

The studies conducted by Oakden and Sturt (1922), Bradley (1947) and Friedman (1944), all mentioned earlier in the chapter, included test items or subtests concerned with children's understanding of time beyond their direct experiences. The references made to historical dates and people were often, however, centuries removed from the students' lifetime. The current research presented vicarious experiences in reading context extending from within the last calendar year to before the subject's lifetime.

Oakden and Sturt (1922) administered an "order of dates" test requiring their subjects to place two series of historical events in correct chronological order. Both series consisted of three statements about the lives of three famous men, including reference to B.C. or A.D. Although the percentage of correct responses increased rather consistently from age 8 to 13 years, the majority of errors revealed students' difficulty in realizing that a larger number referred to a more recent date, the inability of some students to tell which number was bigger

and their confusion regarding the significance of "B.C." and "A.D."

On a similar task using more recent dates and the more familiar names "Mary" and "John" higher test scores were recorded. The researchers interpreted the difference in scores to reflect the difficulty children experience in generalizing their understanding of time to unfamiliar situations. An inconsistency in test design must be considered. Only two statements, neither of which contained the reference B.C. or A.D. were given. Students had a 50% chance of ordering the two statements correctly. To measure the nature of reading comprehension of indefinite time terms, the present study assessed student understanding of 15 indefinite references to time, each used once in two direct and three vicarious experiential contexts.

Another subtest called the "temporal absurdities" test was included to assess the child's capacity to distinguish an historical epoch from the present. The children were instructed to read a passage containing ten wrong or unsuitable references related to or involving time. They were directed to select those incongruent portions and to state why they did not fit the story. Mean test scores for each age group showed a general increase from age 8 to 14 years with a sharp improvement between the ages of 10 and 11 years. Those absurd

statements which emphasized the distinction between past and present, such as Julius Caesar wearing a top-hat, were the easiest to detect. Absurd references involving natural phenomena or personal activity were the next easiest to distinguish while those denoting purely conventional marks of time such as days and dates were the most difficult.

Results from these and other related subtests led Oakden and Sturt to conclude that children encounter some difficulty in the transition and use of ordinary time words to an understanding of historical aspects of time. They further concluded that children did not develop to the adult level of time comprehension until about the age of 13 or 14 years. The current study focused upon reading comprehension of indefinite time terms at an earlier age, 9 to 10 years. Differences of understanding of those terms in direct and vicarious experiential situations, both near and remote to the student's lifetime, were considered.

The replication study conducted by Bradley (1947) supported the findings of Oakden and Sturt. Bradley's research, however, revealed no sharp increase in children's ability to understand historical time concepts between 10 and 11 years of age. The increase was seen as essentially gradual and continuous from age 8 to 15 years.

A portion of Friedman's (1944) research study was concerned with the ability of students in grades four, five and six to understand historical time concepts. A multiple-choice test of time words and dates and another task requiring the chronological sequencing of events both indicated constant progress from grade to grade but incomplete understanding even by grade six. The most difficult tasks involved translating dates into centuries and sequencing dates before and after the birth of Christ. A third section dealing with the location of points on a time-line was extremely difficult for students. The relationship of the test scores to sex differences was statistically insignificant. While the correlation between the intelligence quotients and scores ranged from .21 to .44, the relation of socio-economic status to test results was close to zero.

Similar correlations were found by Friedman and Marti (1945) when they administered comparable time comprehension tasks to 667 students in grades seven to twelve. Sex differences were not statistically significant to test scores except concerning the time-line section where the boys scored significantly higher. Correlations between test scores and both intelligence and grade level were significant but not high. Correlation between test scores and intelligence of students within one grade level was a consideration of the present

research study.

Studies Related to the Effect of
Training on Children's Development
of Historical Time Concepts

The positive influence of training upon time concept development, as revealed by most of the following studies, further emphasized the need to measure and attempt to understand students' comprehension of time concepts at an early grade level to better provide continuing growth through instruction.

In a study to determine whether time concepts were developed through history teaching or maturation, Pistor (1940) employed two groups of sixth-grade students. Each group consisted of 320 students equated on the basis of general intelligence, reading ability and school achievement. One group had taken separate courses in geography and history in grades four and five while the other group had taken a geography course with only incidental reference to history to explain some geography topic.

A four-part time concept test constructed by Pistor (1939) was administered to the entire study sample. Comparison of test scores of the two groups indicated no significant differences between the means of the two groups. Since the students who received instruction in history and chronology in grades four and five did no better than those students without such instruction,

Pistor concluded that previous training had no significant effect upon the development of time concepts of the students studied.

In the sixth grade, the "history group" continued to receive instruction in history and chronology while the "non-history group" received only incidental instruction in history as it related to geography. The battery of time tests was given once again at the beginning of the students' seventh grade. As before, final scores of the two groups were almost the same. Both groups had continued to develop in their comprehension of time with the group receiving no instruction in sixth-grade history and chronology achieving as well as the group who had received such instruction. Pistor cautioned that while the results of his study pointed to maturation, rather than training, as the dominating factor in time concept development, the influence of the many educative aspects such as library reading and radio listening upon the children that could not be controlled by the experimenter must not be overlooked.

The second part of the study by Friedman and Marti (1945), referred to earlier, dealt with the effects of systematic instruction of time concepts upon time comprehension of grade ten students. The four-section time comprehension test was given to three groups of students. For a semester, one group of 72 students

received systematic class instruction in a world history course with exercises and tests emphasizing time-lines, chronological sequences of events and historical time concepts. The second group of 88 students took the same world history course but without systematic instruction regarding time comprehension. The third group of 213 students did not take the world history course nor were they given instruction in comprehending time concepts. Comparison of test scores following the second administration of the time test revealed statistically significant differences between the first and second groups but no significant differences between the second and third groups. The authors concluded from these results that the grade ten students benefitted from specific training in time concepts and that the presence of historical information alone had no effect on the students' ability to comprehend time.

Chase (1961) pointed out the inadequacy of determining when historical time concepts should be taught based primarily upon the maturational or grade level factor. He administered a test in time relations previously constructed by Callahan (Chase, 1961). It required the subjects, 192 fifth-grade and 200 sixth-grade students, to sequence five past events or artifacts in chronological order in each of 24 questions. Chase observed a higher percentage of success by the sixth-grade

children and greater capability of boys over girls in both grades to arrange items in chronological order. Children in both grades were better able to correctly sequence events related to the present than to some past event or artifact. The very significant variation between individual students within the same grade led Chase to warn that any definite instructional allotment of time concepts to certain grade levels based upon earlier research ought to be reconsidered and based instead upon the individual child's learning capability.

Arnsdorf (1961) added further support to the judgment that children can profit from organized instruction of time concepts. The study sample of 563 grade six students was divided into two comparable groups on the basis of sex, class size and intelligence. Both groups studied the same social studies unit for 7 weeks using the same textbook. Only the experimental group received specific instruction of time terms and use of time-lines and charts. A six-part test battery constructed by the experimenter was employed to assess the understanding of historical time by both groups before and after the experimental period. Analysis of test scores showed that differences in four subtests were statistically significant at the .01 level in favor of the experimental group. The two sections favoring the experimental group least dealt with sequencing of undated historical events

and might be related more directly to knowledge of history rather than time concepts.

No significant differences were evident between the test results for the two groups on a work-study skills test given before and after the experiment. Arnsdorf interpreted this finding to substantiate the view that the significant differences observed on the four subtests were attributed to increased understanding and use of time relationships rather than to a general improvement in social studies study skills.

Davis (1963) studied the effect of instruction on the development of geographic time and space concepts related to world time zones. An experimental and a control group each consisting of two classes from grades four, five and six did not differ significantly in intelligence, social studies achievement and understanding of time zones prior to the experimental teaching.

A 46-item test on time zones was devised and administered as a pretest, an immediate posttest and a test of delayed recall. For a period of 3 weeks following the pretest, the experimental classes were given specific instruction by the author of the study using a unit relating to an understanding of geographic time zones while the control groups received no planned training regarding geographic time.

The experimental classes performed significantly

better than the control classes in their understanding of time zones. Davis concluded that those instructed students had profitted from such instruction. Although the differences between grade levels noted at the beginning persisted following the experiment, indicating the effect of the maturational factor on time concept development, Davis postulated that the influence of that factor upon time concept formation may not be as rigid and solitary as once believed. He further suggested that children may be able to gain in the comprehension of time through instruction at a much younger age than previously thought.

Summary

The nature of student understanding of indefinite time terms assessed in the present research by usage in vicarious experiential reading contexts from within the last calendar year to before the subject's lifetime reflects those studies considering comprehension of historical time concepts.

Oakden and Sturt (1922) administered subtests requiring sequencing of historical dates and awareness of incongruent time references. They concluded from their findings that students experience difficulty in transferring their understanding and use of everyday time words to historical time references. Bradley's (1947) partial replication of Oakden and Sturt's study reaffirmed their findings and indicated a gradual, steady increase in

comprehension of historical time concepts by students aged 8 to 15 years.

Friedman (1944) found increasing but incomplete understanding by grade four, five and six students in their comprehension of historical time as measured by knowledge of time words, dates and chronological sequencing. Correlations between test scores and intelligence were positive yet not high while sex differences were statistically insignificant to test scores. Research results obtained by Friedman and Marti (1945) on comparable time comprehension tasks revealed similar relationships.

The positive effect of instruction on time concept development, though not supported by every related study, further indicated the need for the current research to assess the level and nature of comprehension of indefinite time terms at an early grade to provide more adequate and appropriate guidance to foster continuing growth.

Pistor (1940) administered a time concept test to two groups of grade six students whose general intelligence, reading ability and school achievement were considered to be comparable. The test score mean for the group who had separate courses in geography and history in grades four and five did not differ significantly from that of the group who had experienced only incidental history references within a geography course. Pistor's

finding was further supported following similar instructional procedures in grade six and testing at the beginning of grade seven. The experimenter indicated, however, that many other educative aspects were not controlled in his study.

Friedman and Marti (1945) found that grade ten students' comprehension of time improved from specific training in time concepts while the presence of historical time references alone had no effect on students' time comprehension abilities. Following a time comprehension test, three groups of students received systematic instruction of time concepts in a world history course, no systematic time concept instruction in the same world history course and neither the history course or planned instruction, respectively. Scores following the second administration of the test showed that while statistically significant differences existed between the first and second groups, no significant differences were apparent between groups two and three.

Using a time relations test administered to fifth- and sixth-grade students, Chase (1961) noted significant variation of ability between individuals in the same grade to sequence past events or artifacts in chronological order. He concluded that instruction of time concepts should be based upon the child's learning capability rather than primarily on age or grade placement.

Further support for the view that time concept instruction can benefit children was given by Arnsdorf (1961). He constructed and administered a battery of tests to measure historical time concepts of two groups of grade six students equated on the basis of sex, class size and intelligence. Both groups used the same textbook in studying the same social studies unit over a 7-week period. The experimental group received additional, specific instruction of time terms and use of time-lines and charts.

Comparison of pretest and posttest scores indicated statistically significant differences, in favor of the experimental group, in four of the six subtests. No significant differences between the test results on a work-study skills test given before and after the experiment were viewed by Arnsdorf as indicating that the significant differences observed on the four subtests were attributable to an increase in understanding and use of time relationships rather than gains in general social studies skills.

In a study considering the effect of instruction on comprehension of world time zones, Davis (1963) employed experimental and control groups differing insignificantly in intelligence, social studies achievement and comprehension of time zones from each of grades four, five and six. He constructed and administered a time

zone test as a pretest, an immediate posttest and a test of delayed recall. Only the experimental groups were instructed by the experimenter in regards to geographic time zones.

Significantly better test results by the experimental classes prompted Davis to conclude that the students gained from instruction related to time zones. Although he noted that grade level differences indicative of the influence of maturation or age on time concept development remained, Davis suggested that instruction in time comprehension might be appropriate at a younger age than previously considered.

Chapter Summary

Research studies (Friedman, 1944; Gabel, 1940; Gill, 1962; Wesley, 1942; Wesley & Wronski, 1958) revealed the difficulty experienced by students from grade four to senior college levels in interpretation of written indefinite time expressions. The assessment of fourth-grade students' level and nature of understanding of indefinite time terms in the present study attempted to provide greater knowledge and awareness of this interpretation difficulty at the early level of fourth grade.

Jarolimek and Foster's (1959) use of a multiple-choice test format and the desire to employ a test instrument to measure students' reading comprehension of

indefinite time terms independent of their written capability to open-ended questions as required by Arnsdorf (1967) influenced the decision to design and use a multiple-choice test format in the current research study.

Kelty's (1925) attention to both indefinite and definite references to time and her findings indicating student preference for indefinite rather than definite time references even at the sixth-grade level and Gabel's (1940) results suggesting greater understanding and retention of passages containing quantitative terms expressed definitely rather than indefinitely were considered in the formation of test item stems and answer choices for the present study. Definite time expressions were included in each test item stem to provide a more precise meaning for the indefinite time term tested. Answer options permitted students to express their understanding in both definite and indefinite terms.

Time concept growth in relation to frequency of occurrence was noted by Oakden and Sturt (1922). While they and Bradley (1947) found first known time concepts to reflect personal references, Friedman (1944) indicated that reasonable answers to time questions asked in his study were based on the experiential knowledge of the students. Time questions of a personal, immediate nature were found by Farrell (1953) to be better understood and answered at a lower chronological and mental age than were

those of a less personal, more remote quality. Further findings by Oakden and Sturt which were reaffirmed by Bradley indicated student difficulty in transferring understanding and use of everyday time words to historical time references.

The indefinite time terms tested in the present study were selected on the basis of their possible frequency of occurrence. The terms were used in both direct and vicarious experiential context involving time orientations, where appropriate, from within the last calendar year to beyond the students' lifetime, to ascertain the nature of comprehension of those terms.

Several investigations (Ames, 1946; Bradley, 1947; Bromberg, 1938; Farrell, 1953; Friedman, 1944; Newman, 1967; Piaget, 1955) revealed knowledge of time concept development and substantiated the appropriateness of employing time unit measures such as "week," "month" and "year" in the test item answer options of the ITT Test and of administering that test to fourth-grade students aged 9 to 10 years.

Possible correlation between test scores on the ITT Test and verbal and nonverbal intelligence measures of the student sample was considered to bring greater understanding to the relationship, if any, between time concept development and intelligence. The findings of Ames (1946) indicating that knowledge and use of time

concepts depended largely upon maturation did not concur with Harrison's results (1934) revealing a closer relationship between mental or inner maturation than with training and experience as denoted by chronological age or grade placement. Time concept development, as explained by Bromberg (1938), was dependent on intelligence yet occurred at the same relative time in every child's life. While Farrell (1953), Friedman and Marti (1945), Newman (1967) and Walker (1968) found significant correlation between intelligence and scores on tests used in their studies, Friedman (1944) did not.

Although several studies (Farrell, 1953; Friedman, 1944; Newman, 1967; Walker, 1968) concerned with temporal concept development revealed sex to be an insignificant influence, that factor was considered in the current study to ascertain the relationship, if any, that might exist within a narrow age range at one grade level.

The positive effect of instruction on time concept development found by some but not all of the related research, strengthened the need for the current investigation to assess the level and nature of understanding of indefinite time terms at an early grade to more adequately and appropriately provide for continuing growth. Pistor (1940) found no significant differences between test score means on a time concept test for two groups of grade six students, one of which had received separate

geography and history instruction while the other group had experienced only incidental references to history within a geography course. The study of Friedman and Marti (1945) revealed significant differences on a time comprehension test between tenth-grade students who received specific time concept training in a world history course and those students who were given no systematic time concept instruction in the course. The instruction of time concepts was also found by Arnsdorf (1961) to benefit grade six students. Significant differences in four of six subtests given as pretests and posttests were evident between the experimental group receiving direct instruction of time terms in a social studies textbook and those control group members who received no added guidance.

Noting significant variation between individuals in grades five and six to chronologically sequence historical happenings, Chase (1961) concluded that the child's learning capacity rather than primarily age or grade placement ought to be considered when planning instruction of time concepts. Davis (1963) stated that although grade level differences indicative of maturation or age influence on time concept development were evident in his study concerned with the effect of instruction on comprehension of time zones by grade four, five and six students, instruction to further time comprehension

might be considered at an earlier age than previously suggested.

Chapter 3

THE CONSTRUCTION OF THE TEST INSTRUMENT

The Indefinite Time Term (ITT) Test was constructed for this study to assess the level and to describe the nature of fourth-grade students' reading understanding of indefinite time terms. This chapter describes the development of the test instrument in relation to selection of test format, selection of the indefinite time terms to be tested and selection of test item content. The formation of test item stems, distractor answer options and correct and incorrect indefinite and definite test item answer options are also reviewed. A summary of those aspects considered by the researcher in attempting to ensure the validity of the ITT Test concludes the chapter.

The Development of the Indefinite Time Term (ITT) Test

Selection of Test Format

A modified multiple-choice test format was chosen to solicit a dual-response of correct indefinite and correct definite meanings for the indefinite time term presented in the stem of the test item. The choice of test format was based upon:

1. Use of a multiple-choice test instrument in

related research studies (Friedman, 1944; Jarolimek & Foster, 1959),

2. Desire to include a definite time term within the stem of each test item in an attempt to provide a more accurate meaning for the indefinite time term tested and to provide test items of comparable difficulty in all respects other than the direct or vicarious experience and time concept inherent in each test item,
3. Desire to give students the opportunity of selecting both correct indefinite and definite meanings of an indefinite time term, one in the presence of the other, from among several answer choice options,
4. Desire to obtain an objective measure of student understanding of selected indefinite time terms independent of their ability to express that understanding in written form.

Student test directions and a selected item from the ITT Test are given as an example of test item format and student response requirements.

Directions: Read each test question carefully. Ask the teacher to pronounce any capitalized words that you cannot read.

Place the file card under each of the five

meanings given for the underlined word in each test question. Circle Yes or No for each given meaning. Circle Yes for the two (2) best answers.

(Appendix F, Item No. 5)

Glenrose School Hospital opened in September, 1970.

Children with special problems then had a school of their own.

Then means

a. several years ago	Yes	No
b. fourteen years ago	Yes	No
c. had their own school	Yes	No
d. a few weeks ago	Yes	No
e. five years ago	Yes	No

Students were asked to respond to each answer choice option in an attempt to ensure that each option was read and considered as a possible correct choice.

Selection of the Indefinite Time Terms to be Tested

The American Heritage Word Frequency Book (Carroll, Davies & Richman, 1971) was used in the selection of the indefinite time terms tested by the ITT Test. The computer-assembled selection of 5,088,721 words drawn in 500 word samples from 1,045 published materials chosen and sampled to represent the range of required and recommended reading to which students from grades three

to nine in the United States of America are exposed provided an alphabetical listing of 86,741 different words. A frequency column (F) indicated the number of times each entry word occurred in the total corpus of words sampled. The frequency of occurrence of each entry word was also indicated in columns labelled for each grade level from three to nine and for the 17 subject categories from which the total word corpus was drawn.

The 15 indefinite time terms tested in this study were selected according to frequency of usage as indicated in the F column and the probable occurrence of those terms in social studies materials used by fourth-grade students. All entry words listed in The American Heritage Word Frequency Book (Carroll et al., 1971) expressing time indefinitely were noted along with the numbers indicated in the frequency, grade four and social studies columns. To determine the possible frequency of an indefinite time term appearing in grade four social studies materials the following ratio was used:

Frequency of Word Occurrence in Total Corpus	=	Frequency of Word Occurrence in Grade Four Category
Frequency of Word Occurrence in Social Studies Subject Category		Possible Frequency of Word Occurrence in Grade Four Social Studies Materials

The possible frequency of the indefinite time term "soon" in fourth-grade social studies reference

materials was calculated as follows:

$$\frac{2129}{288} = \frac{467}{y}$$

$$2129 \cdot y = 288 \cdot 467$$

$$y = \frac{288 \cdot 467}{2129}$$

$$y = 63.173$$

The ratio for each indefinite time term was checked on two different calculator machines to ensure personal and machine accuracy and then the terms were listed in order by their possible frequency of occurrence in fourth-grade social studies materials.

The 15 indefinite time terms were chosen from among the 21 terms indicated to have the greatest possible frequency of occurrence in grade four social studies references. Each selected term met the following considerations:

- a) Definition of meaning in Webster's Third New International Dictionary (Gove, 1966) indicating an indefinite reference to time,
- b) Possible frequent occurrence in grade four social studies reference materials (y) as indicated by the rank order of indefinite time terms on the list determined using the ratio previously described,
- c) Capacity of each term to express time indefinitely without requiring other accompanying

words (i.e., the terms "about," "long," "around" and "ago" were not selected as they require the use of other words to express an indefinite time concept, e.g. "a long time ago"),

- d) Capacity of each term to be more precisely understood when associated with a definite expression of time (e.g., the terms "often" and "sometimes" were not selected as they could not be more precisely understood through association with an exact time or date).

The 15 time terms were tested in each of the five different contexts previously indicated in chapter 1. The five reading contexts were based upon research findings reviewed in chapter 2.

The terms were always used as the same parts of speech as indicated by their usage as indefinite time terms in Webster's Third New International Dictionary (Gove, 1966). The following denotes the time terms and how they were grammatically employed:

as	- conjunction
when	- conjunction
new	- adjective
then	- adverb
now	- adverb
after	- conjunction

before - conjunction
today - adverb
soon - adverb
still - adverb
old - adjective
during - preposition
early - adjective
until - conjunction
later - adverb

Selection of Test Item Content

The social studies curriculum requirements for grade four students in the Province of Alberta as set out in the handbook Experiences in Decision Making (1971) were indicated as follows:

Grade IV - People in Alberta

- Historical, economic, sociological and/or geographic analysis of Alberta's people, including comparison and contrast with other world areas that have similar historical, geographic and/or economic bases, for example, Australia, Argentina, U.S.S.R., Middle East oil producers, Western U.S.A. and other areas (p. 16).

The content of the test items was based upon the historical, economic and sociological aspects of the above curriculum requirement and social development common to and experienced by students in grade four such as learning to read and to ride a bicycle and participating in special day activities as Hallowe'en and St. Valentine's Day (Appendix B). The 15 test items formulated under each of

the following context categories:

1. Vicarious experience before the subject's lifetime,
2. Vicarious experience within the subject's lifetime but not within the last calendar year,
3. Vicarious experience within the last calendar year of the subject's lifetime

were based equally upon historical, economic and socio-logical aspects related to the study of Alberta. The aspect of geography was not dealt with as it was not considered by the researcher to be appropriate to the present study of indefinite time terms. That is, no definite time reference would give more precise meaning to an indefinite time term used in content considering such geographic features of Alberta as prairie and foothills. Factual information and accompanying definite dates of events pertaining to the three aspects were researched in approximately 20 historical reference books and newspaper clippings from the Edmonton Journal.

The content of test items reflecting a direct experience within the subject's lifetime but not within the last calendar year was based upon experiences believed to be common to most children as indicated in references related to social development of children (Bowley, 1957; Breckenridge & Murphy, 1969; Gardner, 1973).

The test item content related to direct experience within the last calendar year of the subject's lifetime was based upon activities associated with common special days and holidays such as Mother's Day and Easter school vacation.

The 15 indefinite time terms were assigned to the social studies content of the test items in a series of steps. First, the content for the 15 test items within each of the five reading contexts was arranged chronologically from the earliest to latest date of events and then numbered from one to 15 (Appendix B). Next, each of the indefinite time terms was considered for assignment to test item content in order of frequency on the established list (pp. 68-69). A number from one to 15 corresponding to the chronologically arranged test item content within each of the five reading contexts was drawn for each indefinite time term.

The numbers corresponding to the chronologically arranged test item content assigned to each indefinite time term and the two instances where the numbers were exchanged are shown in Table 1. Numbers 4 and 7 in the reading context denoting a vicarious experience within the subject's lifetime but not in the last calendar year and numbers 5 and 14 in the reading context of a direct experience within the subject's lifetime but not in the last calendar year were exchanged because the social

Table 1
Indefinite Time Terms Assigned to Test Item
Content Within Reading Contexts

Indefinite time terms	Test Item Content			Direct experience
	Vicarious experience	Within subject's lifetime but not last calendar year of subject's lifetime	Within last calendar year of subject's lifetime	
as	13	15	8	15
when	7	2	10	3
new	3	5	14 (5)	8
then	1	3	11	9
now	6	14	15	7
after	5	8	3	10
before	2	11	9	2
today	8	13	13	4
soon	14	1	12	6
still	15	9	6	12
old	11	7 (4) a	2	13
during	9	6	7	11
early	10	4 (7)	4	14
until	12	12	1	5
later	4	10	5 (14)	1

Note. Test item content within each of the five reading contexts was arranged chronologically and numbered 1 to 15.

aNumbers in parentheses indicate test item content exchanged for semantic reasons.

studies content as represented by those numbers could not be used semantically with the indefinite time term under consideration.

Formation of Test Item Stems

The format of the stem of each test item resulted from a suggestion made by Walker (1968, p. 126). He suggested that the meaning of an indefinite time term might be better established by providing a "temporal redundancy" whereby the indefinite time term was supported by specific dates within the immediate context. Following is an example of a test item stem from the ITT Test.

Natural gas was found in Alberta today. Natural gas was found near Viking on November 4, 1914.
(Appendix F, Item No. 13)

Each test item stem of the ITT Test consisted of two statements. One statement contained an underlined indefinite time term while the other statement contained a definite time reference in the form of a date which might be used to give a more exact, precise meaning to the indefinite term. The two statements were randomly ordered within each test item stem to avoid order effects.

The readability of the vocabulary used in the test item stems was controlled and considered appropriate by the investigator for grade four students in the following manner:

1. All lower case words used had a Standard

Frequency Index (SFI) or estimated true relative frequency in an infinite corpus of at least 50.0 (occurring once in 100,000 tokens or sampled words) and occurred at least 15 times in grade four or lower reading materials (Carroll, Davies & Richman, 1971). Exceptions such as "province," "holidays" and "hockey" were known from the teaching experience of the researcher to be appropriate terms for fourth-grade Canadian children. The phrase "was signed" was used as no other choice of vocabulary seemed to adequately relay the meaning of signing a treaty.

2. The nature of the social studies content required extensive use of proper nouns which could not be assessed for their readability in the manner described above. Provision for this possible area of reading difficulty was made in the test directions given to the students. Students were directed to ask the teacher to pronounce any capitalized word that they could not read.

The 75 test item stems were read for appropriate choice of content and vocabulary by three experienced teachers of grade four social studies. Although the content was considered appropriate, rephrasing of some test

item stems resulted.

The order of placement of the test item stems for the ITT Test was accomplished through the use of a table of random numbers.

Formation of Distractor Answer Options

On May 29, 1975, a random sample of 25 fourth-grade students chosen from three classrooms from one school designated by Central Office research personnel to be an average middle-class elementary school within the urban Edmonton Public School System responded to the stem of each of the 75 test items by defining in their own words the meaning of the underlined indefinite time terms (Appendix C). Table 2 provides a description of the student sample used in the distractor exercise which was carried out in two sittings, before and after the morning recess break.

Nine students, six girls and three boys, considered by their teachers to be of low, average and high ability in reading achievement and writing ability yet satisfactory or better in oral language expression were individually questioned by the investigator following the definition exercise. Student responses were recorded on a portable tape recorder. The questions as stated in Appendix D were designed to assess the students' reactions to the choice of indefinite time terms tested, the dual-statement format of the test item stem, readability

Table 2
Description of Student Sample Used in
Test Item Distractor Exercise

No. of Students	Ave. Age	Age Range	Ave. Verbal I.Q. Range	Verbal I.Q. Range	Ave. Nonverbal I.Q. Range	Nonverbal I.Q. Range
12 males	9 yrs. 7 mos.	9 yrs. 3 mos.	106	88 - 131	108	83 - 136
			-			
			10 yrs. 1 mo.			
13 females	9 yrs. 8 mos.	9 yrs. 3 mos.	118.7	93 - 139	117.2	96 - 139
			-			
			10 yrs. 4 mos.			
25 total	9 yrs. 8 mos.	9 yrs. 3 mos.	112.6	88 - 139	112.8	83 - 139
			-			
			10 yrs. 4 mos.			

^a As measured by the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level A.

of the vocabulary used and the number of test items. Questions related to experiences thought to be direct by the researcher but which raised some doubt were also asked. No change in vocabulary used and only a slight modification in the content of one test item, number 45, (Appendix G, Item No. 8), resulted from children's responses to the questions.

The most prevalent incorrect definitions of the total group were incorporated as distractors for test item answer choices. Choice was made according to the most frequently stated incorrect meaning unrelated to the concept of time. Exceptions chosen as distractors which were the most frequently stated incorrect meanings but related to time were "one hundred years," "in the month," "day at school" and "the new year."

Formation of Correct and Incorrect
Indefinite and Definite Test Item
Answer Options

The correct and incorrect indefinite and definite options were formulated with consideration of student definitions given in the distractor exercise previously mentioned. Meanings and usage of the terms "few," "several" and "many" within the indefinite options were arbitrarily assigned by the researcher. The term "few" was used "within the subject's lifetime" and as a reference to the quantity of four or less while the term "many" was used in reference to "beyond the subject's lifetime"

and in reference to a quantity beyond ten. The term "several" referred to quantities of five to ten. The order of answer choices for each test item was determined by a table of random numbers.

The appropriateness of the two indefinite and two definite options as well as the incorrect distractor for each of the 75 test items was considered by four graduate students enrolled in a Master's program in reading. The graduate students were asked to read each test item stem and the accompanying five answer options to verify the presence of both correct indefinite and definite meanings as well as the appropriateness of the three incorrect answer choices. Their judgments resulting in no apparent need to modify or change test item answer choices were used by the investigator as verification of the suitability of the two designated correct answer options for each test item as well as the suitability of the three incorrect answer options to fulfill their distracting role within each multiple-choice test item.

Validity of the Indefinite Time Term (ITT) Test

Throughout the development of the ITT Test, the investigator attempted to construct a valid instrument to assess fourth-grade students' reading understanding of selected indefinite time terms. The following aspects related to the development of the ITT Test, although

previously introduced, were considered by the researcher in an attempt to develop a valid test instrument:

1. Decision to use a multiple-choice test to assess student understanding of indefinite time terms as did previous researchers (Friedman, 1944; Jarolimek & Foster, 1959),
2. Provision of a definite time term within the stem of each test item to provide a more focused meaning for the indefinite time term tested and to provide test items of comparable difficulty in all respects other than the direct or vicarious experience and time concept inherent in each test item,
3. Opportunity for students to indicate their understanding of an indefinite time term in both correct indefinite and definite meanings, one in the presence of the other, from among several answer choice options as students are required to comprehend both indefinite and definite time expressions presented intermittently in reading materials,
4. Objective measure of student understanding of selected indefinite time terms independent of their ability to express that understanding in written form,
5. Selection of 15 indefinite time terms

according to assigned indefinite meaning in a dictionary, possible frequent occurrence in grade four social studies reference materials, capacity to express time indefinitely without requiring accompanying words and capacity of terms to be more precisely understood when associated with a definite time term,

6. Testing of each indefinite time term in five test items, each stressing a different reading context,
7. Use of each indefinite time term as the same part of speech each time it was tested,
8. Use of indefinite time terms in social studies test item content based upon factual historical, economic and sociological aspects of Alberta and social development common to and experienced by students in grade four as indicated in references related to children's social development as well as activities associated with common special days and holidays as St. Valentine's Day and Remembrance Day,
9. Systematic assignment of indefinite time terms to social studies test item content and random ordering of the two statements in the test item stem to avoid order effects,

10. Control upon the readability of non-capitalized vocabulary and teacher assistance offered for unknown capitalized vocabulary in test items,
11. Choice of test item stem content and vocabulary considered appropriate by three experienced classroom teachers of grade four social studies,
12. Distractors for test item answer choices derived from most prevalent incorrect definitions given by fourth-grade students of indefinite time terms used in test item stems. Correct and incorrect indefinite and definite answer options formulated considering student definitions given in the same exercise,
13. Order of test item stems within the ITT Test and order of answer choices for each test item determined by a table of random numbers,
14. Consideration of the appropriateness of the two indefinite and two definite answer options as well as the incorrect distractor for each test item by four graduate students enrolled in a Master's program in reading.

Summary

Chapter 3 reviewed the construction of the ITT Test. The selection of a modified multiple-choice test format and the choice of 15 indefinite time terms to be tested in social studies content were discussed. Formation of test item stems and answer options was also considered. A summary of those aspects considered by the researcher in an attempt to construct a valid instrument to assess fourth-grade students' understanding of written indefinite time terms concluded the chapter.

Chapter 4

THE EXPERIMENTAL DESIGN

The design of the present research study, the student sample used, the test instrument constructed and employed and the pilot study are described in this chapter. The collection of data for the main study and the statistical treatment of that data are also considered.

The Design of the Study

The Indefinite Time Term (ITT) Test constructed for this correlational research study was administered during the week of October 6-10, 1975, to a sample of 201 grade four students aged 9 to 10 years enrolled in three middle-class elementary schools within an urban school system. The test was given in two parts on two consecutive mornings by 12 classroom teachers following detailed, written directions (Appendix E). A table of random numbers was used to determine the order of administration of test parts for each student.

The scoring of the tests and statistical treatment of the data were carried out using the facilities of the Division of Educational Research Services, Faculty of Education, University of Alberta.

The Student Sample

The sample used in the present study was drawn from the fourth-grade student population within the Edmonton Public System. Three elementary schools, designated as middle-class by the research personnel within the urban school system, were assigned to the researcher. The study sample of 201 students, 96 male and 105 female, was selected from within 12 classes in the three schools in accordance with the following complete information as indicated on student cumulative record cards: birthdates showing an age of 9 to 10 years, verbal and nonverbal intelligence quotients as measured by the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level A, and general reading ability as revealed by the Word and Paragraph Meaning percentiles on the Stanford Achievement Test, Form X, Intermediate 1. The chronological ages and intellectual and reading abilities of the student sample are summarized in Table 3.

Chronological Age

Age means and distribution ranges indicate the male and female sample members were of similar chronological age. Male, female and total group mean age was 10 years 1 month with an age range from 9 years 7 months to 10 years 11 months (Table 3). Table 4 indicates the distribution of student age in years and months, including

Table 3

Summary Description of Main Study Student Sample

Number of Students	Age		Verbal I.Q. ^a		Nonverbal I.Q. ^a		Word Meaning	Paragraph Meaning	Range of Percentiles ^b
	Ave.	Range	Ave.	Range	Ave.	Range			
96 Males	10 yrs. 1 mo.	9 yrs. 7 mos.	111.58	80-147	111.25	74-145	3-98	3-98	3-98
	-	10 yrs. 11 mos.							
105 Females	10 yrs. 1 mo.	9 yrs. 7 mos.	111.49	77-150	112.06	77-147	3-99	1-99	3-99
	-	10 yrs. 11 mos.							
201 Total	10 yrs. 1 mo.	9 yrs. 7 mos.	111.54	77-150	111.67	74-147	3-99	1-99	3-99
	-	10 yrs. 11 mos.							

^a As measured by the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level A.

^b As measured by the Stanford Achievement Test, Form X, Intermediate 1.

Table 4
 Age of Main Study Student Sample
 in Years and Months

Age in Years, Months	No. of Males	No. of Females	Total No. of Students
9 - 7	3	5	8
9 - 8	12	7	19
9 - 9	4	7	11
9 - 10	6	9	15
9 - 11	7	6	13
10 - 0	6	4	10
10 - 1	5	12	17
10 - 2	6	13	19
10 - 3	5	11	16
10 - 4	11	9	20
10 - 5	13	5	18
10 - 6	5	7	12
10 - 7	7	3	10
10 - 8	2	4	6
10 - 9	2	0	2
10 - 10	1	0	1
10 - 11	1	3	4
Total	96	105	201

the number of males and females found at each age level. The age distribution of male and female students was similar. That is, while 55.2% and 39.6% of the males were above and below the student age mean, respectively, 52.4% and 36.2% of the females were found at those levels.

Intellectual Ability

Although the average male verbal I.Q. was found to be close to the average female verbal measure the distribution of verbal I.Q. scores from the student mean verbal I.Q. favored the female students of the study sample. The average male and female verbal scores were 111.58 and 111.49, respectively (Table 3). The range of total student verbal intelligence quotients from 77 to 150 (Table 3) is further considered in Table 5 where the number and percentage of males and females whose verbal score fell within a 10-point range from 70-79 to 140+ is noted. Whereas only 25.7% of the females had verbal scores below the student mean verbal I.Q. range of 110-119, 47.9% of male scores were found below that level. While 44.8% of the female scores were above that range, only 30.2% of the male verbal measures were above the average verbal score range. A comparison of male and female verbal I.Q. scores, therefore, indicates nearly twice as many male verbal scores than female scores below the average range of 110-119. A greater percentage of female scores, approximately 1 1/2 times the number of male verbal

Table 5

Verbal and Nonverbal Intelligence Quotient Range
of Main Study Student Sample

I.Q. Score Range	Verbal						Nonverbal						
	Males			Females			Total Students	Males			Females		
	No.	%	No.	No.	%	No.	%	No.	%	No.	%	Total Students	
70 - 79	1	1.0	2	1.9		3	2	2.1	2	1.9		4	
80 - 89	9	9.4	1	1.0		10	9	9.4	6	5.7		15	
90 - 99	15	15.6	13	12.4		28	14	14.6	17	16.2		31	
100 - 109	21	21.9	11	10.5		32	15	15.6	17	16.2		32	
110 - 119	21	21.9	31	29.5		52	25	26.0	32	30.5		57	
120 - 129	15	15.6	37	35.2		52	18	18.8	17	16.2		35	
130 - 139	9	9.4	8	7.6		17	10	10.4	11	10.5		21	
140+	5	5.2	2	1.9		7	3	3.1	3	2.8		6	
Total	96	100.0	105	100.0		201	96	100.0	105	100.0		201	

Note. Student intelligence was measured by the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level A.

measures, were above the average range of verbal scores.

The average female nonverbal I.Q. score differed only slightly from that of the male students and the distribution of female nonverbal intelligence measures from the student mean range also showed limited variance from comparable male scores. The mean nonverbal male and female scores were 111.25 and 112.06, respectively (Table 3). The range of total student nonverbal intelligence scores from 74 to 147 (Table 3), further considered in Table 5, indicates that while 40% of female nonverbal scores fell below the 110-119 mean range, a similar percentage, 41.7%, of the male scores were below that range. Likewise, 29.5% and 32.3% of the nonverbal I.Q. measures for females and males, respectively, were found beyond that average range.

Considering both verbal and nonverbal intellectual assessments, only slight differences between verbal and nonverbal I.Q. means for males and females were evident. Whereas comparable range distribution from the group mean was noted for both groups regarding nonverbal measures, distribution of verbal scores revealed more females than males having verbal scores above the total student mean.

Reading Ability

The distribution of percentiles for the Word Meaning and Paragraph Meaning test sections shown in Table 3 reveal a wide range of reading achievement within

the student study sample. Male students placed from the 3rd to the 98th percentile on both the Word Meaning and Paragraph Meaning subtests while the female students ranked from the 3rd to the 99th percentile on the Word Meaning subtest and from the 1st to the 99th percentile on the Paragraph Meaning test section. These percentiles are further considered (Table 6) according to the number and percentage of students who placed within each 10-point range from 0-9 to 90-99. A higher reading achievement level for males than for females is reflected in the percentage of male and female students who had percentile placements for the Word and Paragraph Meaning sections above and below the percentile range of 50-59. While 33.3% of the males had a percentile rank for Word Meaning below the 50-59 range, 48.5% of the female percentile ranks for that section were below that range level. A larger percentage of males than females placed above the percentile range of 50-59 for both the Word and Paragraph Meaning subtests. Whereas 52.1% and 54.2% of the males ranked above that range on the Word Meaning and Paragraph Meaning sections, respectively, only 41% and 44.8% of the females placed beyond that percentile range on the two test portions.

Summary

The 96 male and 105 female fourth-grade students who comprised the study sample were of a mean age of

Table 6
Word Meaning and Paragraph Meaning Percentile Range
of Main Study Student Sample

Percentile Range	Word Meaning						Paragraph Meaning					
	Males			Females			Males			Females		
	No.	%	No.	%	Total Students	No.	%	No.	%	Total Students	No.	%
0 - 9	3	3.1	7	6.7	10	8	8.3	8	7.6	16	11	10.5
10 - 19	7	7.3	10	9.5	17	9	9.4	11	10.5	20	5	4.7
20 - 29	8	8.3	10	9.5	18	3	3.1	5	4.7	8	9	8.6
30 - 39	5	5.2	8	7.6	13	7	7.3	9	8.6	16	10	15.2
40 - 49	9	9.4	16	15.2	25	10	10.4	16	15.2	26	16	15.2
50 - 59	14	14.6	11	10.5	25	7	7.3	9	8.6	16	11	10.5
60 - 69	8	8.3	10	9.5	18	10	10.4	11	10.5	21	16	15.2
70 - 79	9	9.4	14	13.4	23	16	16.7	11	10.5	27	11	10.5
80 - 89	18	18.8	12	11.4	30	8	8.3	12	11.4	20	18	12.4
90 - 99	15	15.6	7	6.7	22	18	18.8	13	12.4	31	13	12.4
Total	96	100.0	105	100.0	201	96	100.0	105	100.0	201	105	100.0

Note. Student Word Meaning and Paragraph Meaning percentiles were derived from performance on the Stanford Achievement Test, Form X, Intermediate 1.

10 years 1 month with a similar age distribution for both male and female students above and below the student age mean. Although the average male verbal I.Q. measure was near that of the average female verbal score, the verbal I.Q. score distribution from the student mean range of 110-119 favored the females. Nearly twice the number of male than female verbal scores fell below the average range while more female verbal measures, 1 1/2 times the number of male scores, were above that mean verbal range. Average male and female nonverbal intelligence measures and the distribution of nonverbal scores for both males and females from the student mean range of 110-119 differed only slightly. The wide range of reading ability shown to exist within the study sample revealed that the males, as a group, were better readers than the females. That is, a greater percentage of female than male students had percentile placements below the 50-59 range for the Word and Paragraph Meaning test sections and a greater percentage of male than female students had percentile ranks above that range for both reading subtests.

The Test Instrument

Chapter 3 reviewed the construction of the ITT Test, a 75-item multiple-choice test constructed to assess fourth-grade students' level and nature of understanding of 15 selected indefinite time terms. The terms

were each tested in five reading contexts, stressing direct and/or vicarious experiences in time varying from within the last calendar year of the student's lifetime to beyond his lifetime. The test instrument gave students the opportunity to indicate their understanding of each indefinite time term presented in social studies content through a possible dual-selection of both correct indefinite and correct definite meaning choices.

The ITT Test consisted of two parts, A and B. Part A (Appendix F) contained 37 items while Part B (Appendix G) consisted of 38 items.

The Pilot Study

The ITT Test was administered in a pilot project to examine the suitability of the multiple-choice test item format modified to require a dual-choice response, the test item content and the direction and administration procedures. The ITT Test was given by the researcher on June 11, 1975, to a heterogeneous group of fourth-grade students enrolled in an elementary school in the Edmonton Public System, designated by research personnel within that system as being in a middle-class community. The 75-item test was given to 39 students whose cumulative records indicated student age between 9 and 10 years, verbal and nonverbal intelligence quotients as assessed by the Canadian Lorge-Thorndike Intelligence Test, Form 1,

Level A as well as Word and Paragraph Meaning percentiles as shown by student performance on the Stanford Achievement Test, Form X, Intermediate 1. The chronological ages and intellectual and reading abilities of the pilot student sample are summarized in Table 7.

Whereas male and female age means differed only slightly, the distribution of percentages for numbers of males and females above and below the total student age mean reveals that, as a group, the female students were older than the males (Appendix H, Table B). The age means for the 23 males and 16 females were 9 years 8 months and 9 years 9 months, respectively, with a total student age mean of 9 years 8 months. A comparison of means of verbal I.Q. scores reveals greater verbal ability for female than male pilot study sample members. The female mean verbal I.Q. measure of 114.81 was above the student mean of 110.45 while the male verbal score of 106.09 averaged below the total student mean. Male rather than female pilot sample members, as a group, were found to have slightly greater nonverbal intellectual ability. The average male and female nonverbal assessments of 110.52 and 108.56, respectively, fell above and below the total group mean of 109.54. Distribution of verbal and nonverbal intelligence measures are further considered in Appendix H, Table C. Student percentile placements from 2 to 98 for Word Meaning and from 1 to 98

Table 7
Summary Description of Pilot Study Student Sample

Number of Students	Age		Verbal I.Q. ^a		Nonverbal I.Q. ^a		Range of Percentiles ^b	
	Ave.	Range	Ave.	Range	Ave.	Range	Word Meaning	Paragraph Meaning
23 Males	9 yrs. 8 mos.	9 yrs. 3 mos.- 10 yrs. 7 mos.	106.09	81-139	110.52	85-133	2-94	1-88
	9 yrs. 9 mos.	9 yrs. 2 mos.- 10 yrs. 6 mos.	114.81	82-140	108.56	83-136	10-98	12-98
	9 yrs. 8 mos.	9 yrs. 2 mos.- 10 yrs. 7 mos.	110.45	81-140	109.54	83-136	2-98	1-98
39 Total								

^a As measured by the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level A.

^b As measured by the Stanford Achievement Test, Form X, Intermediate 1.

in the Paragraph Meaning subtest indicate a wide range of reading ability present within the pilot student sample. Higher reading achievement for females than for males is exemplified by the percentage of male and female students having percentile placements for the Word and Paragraph Meaning test portions above and below the percentile range of 50-59 (Appendix H, Table D).

Personal data obtained on the 39 subjects from their cumulative record files were recorded on data sheets by the investigator before being punched on IBM cards. Students' responses to each test item were manually transferred by the researcher from the test booklets to data sheets. The responses were then indicated on data cards by an IBM 029 keypunch machine prior to scoring and statistical analyses using programs supplied or developed by the Division of Educational Research Services at the University of Alberta.

Student performance revealed no difficulties related to test item format requiring a dual-choice response. Test item content appeared to be readable and the vocabulary control upon non-capitalized words and the option of teacher assistance with capitalized words seemed adequate as judged by the limited requests for assistance. The decision to divide and administer the ITT Test in two parts to be given on two consecutive days was made when students required more time to complete the

test than the researcher, from classroom teaching experience, thought feasible for fourth-grade students to perform their best during one sitting. The pilot administration also revealed to the investigator where teacher directions should be more detailed.

Collection of the Data for Main Study

As indicated previously, personal data for the main study concerning chronological age, sex, intelligence test scores and reading subtest percentiles were obtained for each student from cumulative record cards. The students had taken the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level A during January or February, 1974, and as both verbal and nonverbal subtest scores were available, these recent measures based upon Canadian norms were felt to be valid intelligence assessments of the students in the sample for the purposes of this investigation.

Percentiles for the Word Meaning and Paragraph Meaning subtests of the Stanford Achievement Test, Form X, Intermediate 1 were accessible and were considered for the purpose of this study to be valid measures of the reading ability of the students in the sample. A review of the reading test in The Mental Measurements Yearbook (Buros, 1965) stated that the Stanford Achievement Test "is recommended for use in the analysis of . . .

differences in the abilities of individual pupils in the various subjects for purposes of . . . evaluating achievement" (p. 121). The average estimates of reliability, ranging from .88 to .90, were also mentioned as an indication that the test may appropriately serve these purposes.

Student responses on ITT Test booklets were manually transferred by the researcher to computer data sheets in preparation for scoring and statistical analyses.

Treatment of the Data

Student responses to the Indefinite Time Term (ITT) Test and the data obtained from the school records were punched on data cards and the information was analyzed using the computer facilities of the Division of Educational Research, Faculty of Education, University of Alberta.

A computer program was utilized to assess consistency of student performance as an indication of the reliability of the ITT Test. The program considered correlation between the order of test administration of Parts A and B. Test scores for students who had taken Part A first were correlated with test scores on Part B which was taken on the second morning. Likewise, Part B scores for students who were administered that section first were correlated with their scores on Part A received the following day. The .05 level of confidence

was chosen to determine significance of student consistency of performance.

A program developed and used to test hypotheses one, two and three scored student test item responses to indicate the following:

1. The number of test items indicating both correct indefinite and definite meanings, the correct indefinite meaning, the correct definite meaning,
2. The number of answer choices on the five items testing each of the 15 indefinite time terms indicating both correct indefinite and definite meanings, the correct indefinite meaning, the correct definite meaning,
3. The number of answer choices for 15 indefinite time terms tested in five reading contexts indicating both correct indefinite and definite meanings, the correct indefinite meaning, the correct definite meaning.

The fourth hypothesis involving the relationship, if any, between ITT Test scores and the five variables examined in the study was tested by calculating the Pearson's product-moment coefficients of correlation. The .01 level of confidence was chosen to determine significance of the five variables to student performance on the ITT Test.

Summary

The Indefinite Time Term (ITT) Test was administered to 201 fourth-grade students from three urban elementary schools. Following the construction and pilotting of the instrument designed for this study, the 75-item multiple-choice test was given in two parts on consecutive mornings by 12 regular classroom teachers. The data from these tests together with data obtained from student school records were analyzed by computer programs developed or supplied to indicate the level and nature of student performance. Chapter 5 follows with the findings as revealed by these analyses.

Chapter 5

THE FINDINGS OF THE STUDY

Chapter 5 reports the research findings of the present study as revealed from analyses of student performance on the Indefinite Time Term (ITT) Test. Measures of the reliability of that test are presented and discussed. Student correct responses on the ITT Test are reported and discussed and further considered according to student performance on the five items testing each indefinite time term and for the 15 indefinite time terms tested in five reading contexts. The relationships between student performance of both correct indefinite and definite meanings and verbal and nonverbal intelligence quotients, Word and Paragraph Meaning percentiles and sex are given and discussed. A summary of findings concludes the chapter.

Reliability of the Indefinite Time Term (ITT) Test

Correlations between the order of test administration of Parts A and B were computed to assess the degree of consistency of student response on the two sections comprising the ITT Test. That is, students' scores on Part A, administered first, were correlated with the same students' scores on Part B, administered

the second day and vice versa. These correlation coefficients for the ten possible student answer choice combinations are reported in Table 8. High, positive correlations beyond the .05 level of significance were found to exist, independent of test order administration, between student response on Parts A and B. There is, then, for the ITT Test, a high degree of reliability (McCullough and Van Atta, 1965).

Means and standard deviations for the ten possible dual-answer choice selections were also calculated to indicate the consistency of student response on the two test parts administered on consecutive days. Table 9 reveals the means and standard deviations of performance for students who received Part A first while Table 10 relates those performance measures for students who were first given Part B.

The mean performance scores for Parts A and B did not differ greatly or consistently for either group of students who initially received Part A or Part B. Although second day administrations (Part B, Table 9; Part A, Table 10) revealed a higher test item mean of both correct definite and correct indefinite answer choices, that trend was not consistent concerning other answer choice means. For example, while the mean student performance of both correct indefinite and correct definite meanings on Parts A and B, administered in that

Table 8
Correlation Coefficients Between Student Responses on Parts A and B

Order of Adminis- tration	Student Responses							
	Cor. Def.,	Cor. Def.,	Cor. Def.,	Cor. Def.,	Cor. Incor.	Cor. Incor.	Cor. Def.,	Cor. Def.,
Part A First	.821	.198	.254	.841	.485	.439	.679	.646
Part B First	.905	.223	.197	.893	.196	.802	.558	.728
							.603	.581
							.664	.727

Note. All coefficients were significant beyond the .05 level of confidence.

Table 9
Means and Standard Deviations of Performance on the ITT Test
for Students Administered Part A First

Test Part	Student Responses					
	Cor. Def., Incor. Indef.	Cor. Def., Incor. Indef.	Cor. Def., Incor. Indef.	Cor. Def., Incor. Indef.	Cor. Def., Incor. Indef.	Cor. Def., Incor. Indef.
A^a						
(Day 1)						
Mean	11.196	.980	1.049	9.186	1.157	1.029
S.D.	10.816	1.428	1.471	9.341	1.506	1.757
B^b						
(Day 2)						
Mean	14.049	1.657	.990	8.990	1.059	1.029
S.D.	13.681	1.886	1.445	11.238	1.274	1.790

^a Total possible score equals 37.

^b Total possible score equals 38.

Table 10

Means and Standard Deviations of Performance on the ITT Test
for Students Administered Part B First

		Student Responses					
		Cor. Def., Cor. Indef.	Cor. Def., Incor. Def.	Cor. Def., Incor. Indef.	Cor. Def., Incor. Indef.	Cor. Def., Incor. Indef.	Cor. Def., Incor. Indef.
Test	B ^a						
	(Day 1)						
Mean	13.081	1.404	.899	7.586	.919	1.424	2.232
S.D.	11.461	1.537	1.068	9.407	1.186	2.796	2.573
Test	A ^b						
	(Day 2)						
Mean	15.838	.717	.788	9.545	.869	1.404	2.414
S.D.	14.386	1.248	1.148	11.510	1.433	4.080	3.120

^a Total possible score equals 38.

^b Total possible score equals 37.

order, was 11.196 and 14.049, respectively, only three of the nine other answer choice combinations indicated higher means for Part B. Whereas the mean student response of both correct meanings on Parts B and A, administered in that order, was 13.081 and 15.838, respectively, only two of the nine other combinations of answer choices showed higher means for Part A. Student familiarity with the ITT Test format during the second presentation might partially explain the increase in test item means indicating both correct definite and indefinite answer options.

Standard deviations from mean student performance on the ten possible dual-answer choice options also indicated no great or consistent differences between test part performance for either group of students initially receiving Part A or B. Although standard deviation measures relating to both correct definite and correct indefinite answer choices were larger for second day administrations, that tendency was not consistent concerning the standard deviations from other answer choice means. That is, while the standard deviation from the mean performance of both correct indefinite and correct definite meanings on Parts A and B, given in that order, was 10.816 and 13.681, respectively, only five of the nine other answer combinations indicated greater standard deviations for Part B. Likewise, while the

standard deviation from mean performance of both correct responses on Parts B and A, administered in that order, was 11.461 and 14.386, respectively, only five of the nine other answer option combinations showed higher standard deviations for Part A. The distribution of scores were, therefore, quite similar from Part A to B and vice versa.

Student Correct Responses
on the ITT Test

Table 11 reports student performance on the ITT Test as indicated by their selection of both correct indefinite and definite meanings. Seventy students (34.8%) chose both correct meanings for 36 (48%) or more of the 75 test items. That is, only 1/3 of all students selected both a correct indefinite meaning and a correct definite meaning in the presence of the other for nearly half or more of the test items. Of those 70 students, 36 or 17.9% of all students responded correctly with both meanings for 61 or more test questions.

On the other hand, nearly 1/4 (23.9%) of all students selected both correct responses for only five or fewer test items. Both correct answer choices were chosen for 15 or fewer test items by 101 students or 50.2% of the student sample. Approximately half the student sample, then, chose correct dual-responses for 1/5 or fewer of the total number of test items. The

Table 11

Student Selection of Both Correct Indefinite
and Definite Meanings

Number of Test Items Correct	Students	
	Number	Cumulative %
0 - 5	48	23.9
6 - 10	26	36.8
11 - 15	27	50.2
16 - 20	6	53.2
21 - 25	14	60.2
26 - 30	5	62.7
31 - 35	5	65.2
Sub-Total	131	65.2
36 - 40	4	67.2
41 - 45	8	71.1
46 - 50	12	77.1
51 - 55	4	79.1
56 - 60	6	82.1
61 - 65	15	89.6
66 - 70	11	95.0
71 - 75	10	100.0
Sub-Total	70	34.8
Total	201	100.0

majority of students, 65.2%, therefore, were unable to select both correct indefinite and definite meanings simultaneously for 36 or more of the 75 test items.

Student selection of only the correct indefinite meaning is shown in Table 12. While 47.3% of all students were able to choose the correct indefinite meaning for 36 or more of the 75 test items, a slightly larger percentage, 52.7%, were able to select the correct indefinite response for only 35 or fewer test items. That is, nearly 1/2 of all students (47.3%) chose correct indefinite answer choices for 36 or more of the 75 test items.

Table 13 reveals student selection of only the correct definite response. Nearly 3/4 of all subjects (72.6%) selected the correct definite meaning option for 36 or more of the 75 test items. More students were able to select the correct definite meaning for more test items than the correct indefinite answer choice.

When given the opportunity of choosing both correct indefinite and correct definite meanings for an indefinite time term the study sample students were better able to express their understanding in definite rather than indefinite meanings. Students were, however, better able to select another indefinite meaning than to indicate complete understanding of an indefinite time term in both indefinite and definite meanings. These current findings give further support to the difficulty found by

Table 12

Student Selection of Only Correct
Indefinite Meaning

Number of Test Items Correct	Students	
	Number	Cumulative %
0 - 5	9	4.5
6 - 10	16	12.4
11 - 15	13	18.9
16 - 20	19	28.4
21 - 25	18	37.3
26 - 30	17	45.8
31 - 35	14	52.7
Sub-Total	106	52.7
36 - 40	12	58.7
41 - 45	11	64.2
46 - 50	8	68.2
51 - 55	14	75.1
56 - 60	8	79.1
61 - 65	9	83.6
66 - 70	18	92.5
71 - 75	15	100.0
Sub-Total	95	47.3
Total	201	100.0

Table 13

Student Selection of Only Correct
Definite Meaning

Number of Test Items Correct	Students	
	Number	Cumulative %
0 - 5	1	.5
6 - 10	5	3.0
11 - 15	3	4.5
16 - 20	10	9.5
21 - 25	13	15.9
26 - 30	10	20.9
31 - 35	13	27.4
Sub-Total	55	27.4
36 - 40	11	32.8
41 - 45	14	39.8
46 - 50	15	47.3
51 - 55	12	53.2
56 - 60	18	62.2
61 - 65	27	75.6
66 - 70	20	85.6
71 - 75	29	100.0
Sub-Total	146	72.6
Total	201	100.0

Friedman (1944), Wesley (1942), Wesley and Wronski (1958) and Gill (1962) in comprehension of indefinite time terms. When provided with the opportunity to express their understanding of an indefinite time term in both definite and indefinite responses, students were better able to express their understanding in definite rather than indefinite terms. The tendency of selecting appropriate meaning of an indefinite time term in definite rather than another indefinite time expression reflects accordance both with the statement of Schlinder, Spieseke, Bard, Darrin and Schmuck (1953) expressing their conviction that indefinite time terms were more difficult for children to comprehend than definite references to time and Walker's (1968) research finding indicating comprehension of time concepts expressed in definite terms was greater than if those concepts were stated in indefinite terms.

Student Correct Responses for Each
Indefinite Time Term Tested by
the ITT Test

Student performance on the five items that test each indefinite time term as indicated by their choice of both correct indefinite and definite meanings, only the correct indefinite meaning and only the correct definite meaning is reported in Table 14. The 15 indefinite time terms tested by the ITT Test are listed according to their placement on the frequency list determined for this study

Table 14

Student Selection of Both Correct Indefinite and Definite Meanings,
Only the Correct Indefinite Meaning, Only the Correct
Definite Meaning on Five Items Testing
Each Indefinite Time Term

Student Selections					
Indefinite Time Terms	Both Correct Indefinite and Definite Meanings	Column 1		Column 2	
		No.	%	No.	%
as	361	35.9		503	50.1
when	371	36.9		486	48.4
new	318	31.6		462	46.0
then	379	37.7		511	50.9
now	304	30.3		408	40.6
after	409	40.7		608	60.5
before	441	43.9		551	54.8
today	334	33.2		448	44.6
soon	285	28.4		385	38.3
still	297	29.6		420	41.8
old	409	40.7		591	58.8
during	363	36.1		526	52.3
early	388	38.6		543	54.0
until	367	36.5		493	49.1
later	390	38.8		527	52.4

Note.

The total possible number of student selections for each indefinite time term as indicated in columns 1, 2 or 3 equals 1005 (201 x 5).

and described in chapter 3.

Although student selection of correct responses on each set of five items testing one of the 15 indefinite time terms differed from student correct performance on most or all five items testing one of the 14 other indefinite time terms, only limited differences in student understanding of one term over the others are indicated. The following time term considerations, as examples, consider those terms which received the most and the least favorable student response. The total number and percentage of both correct responses for the terms "before" and "soon" differed from 441 (43.9%) to 285 (28.4%), respectively, a difference of 15.5% (Column 1). The total number and percentage of correct indefinite meanings for the terms "after" and "soon" differed from 608 (60.5%) to 385 (38.3%), respectively, a difference of 22.2% (Column 2). Likewise, the correct definite meaning selections for the terms "when" and "soon" differed from 733 (72.9%) to 530 (52.7%), respectively, a difference of 20.2% (Column 3). The percentage difference total of student performance indicating the most and least understanding of the indefinite time terms was, therefore, 22.2% or less.

Total student understanding of each indefinite time term proceeded in a manner similar to that indicated by student correct response on the ITT Test previously

discussed. When presented with both correct definite and indefinite meanings for each term tested, students were more able to select the correct definite meaning than the correct indefinite meaning. Students were, however, more able to select the correct indefinite meaning than both the correct indefinite and definite meanings. For example, students chose 72.9% of correct definite meanings, 48.4% of correct indefinite meanings and 36.9% of both correct indefinite and definite meanings for the term "when." As well, students chose 52.7% of correct definite responses, 38.3% of correct indefinite responses and 28.4% of both correct indefinite and definite meanings for the term "soon."

The order of indefinite time terms as indicated by the frequency list established to facilitate selection of terms to be tested in this study (as reported in chapter 3) bears little resemblance to the order of those terms as revealed by student selection of correct meanings (Table 15). That is, terms such as "as," "before" and "later" which appeared at the top, middle and bottom, respectively, of the frequency list, differed consistently and considerably in their placement in the lists derived from student selection of correct meanings. Understanding of the 15 time terms tested, therefore, did not appear to develop according to their possible frequency of occurrence in social studies reference material. This finding is not supportive of Oakden and Sturt's (1922) research results

Table 15

Indefinite Time Terms as Ordered on Frequency
List and by Student Selection of
Correct Meanings

Frequency List ^a Order	Order by Student Selection		
	Column 1	Column 2	Column 3
	Both Correct Indefinite and Definite Meanings	Only Correct Indefinite Meaning	Only Correct Definite Meaning
1. as	10	8	9
2. when	7	10	1
3. new	12	11	14
4. then	6	7	4
5. now	13	14	13
6. after	2	1	6
7. before	1 ^b	3	3
8. today	11	12	11
9. soon	15	15	15
10. still	14	13	12
11. old	2	2	5
12. during	9	6	7
13. early	5	4	8
14. until	8	9	10
15. later	4	5	2

^a Terms numbered in order from most frequent to less frequent.

^b 1 means the term for which students scored the highest number correct.

suggesting a tendency for the development of a time concept according to the frequency of its recurrence. From their results, those indefinite time terms possibly occurring most frequently in social studies reference materials, that is, occurring at the top of the frequency list, would tend to be better understood than those possibly appearing less frequently. Research findings from this present study do not support this prediction. Kelty's (1925) finding, however, concerning little positive relationship between median test score performance for individual time words and the frequency of occurrence of the same words in primary readers, on the basis of the related results of the current study is further strengthened. Perhaps the fact that the terms were indefinite in nature made them difficult to comprehend rather than their possible frequency of occurrence.

A closer consistency of order was, however, apparent considering indefinite time term placement in the three columns ranked according to student selection of both correct indefinite and definite meanings, only the correct indefinite meaning and only the correct definite meaning (Table 15). The terms "before," "old," "later" and "after," for example, ranking in the top six terms in all three correct meaning columns, were shown to be consistently better understood while the terms "today," "new," "now," "still" and "soon," ranking

in the bottom five positions within each of the three columns, were found to be consistently less well understood than the other time terms tested in the study. Students' consistent choice of fewer correct meanings for these latter five time terms used in the presence of a past, definite time term provided to give a more precise meaning to those indefinite terms supports Oakden and Sturt's (1922) research conclusion that children encounter some difficulty in the transition and application of ordinary time words to an understanding of historical time. The terms "now" and "today," found by Ames (1946) to be the first time words verbalized in spontaneous speech near 2 years of age might be termed "ordinary" time words. Friedman's (1944) finding of even less logic in student responses to events in the future than to those related to the past might partially explain the consistent, lesser understanding of the term "soon" as compared to correct student performance concerning all the other 14 indefinite time terms tested.

Student Correct Responses for Fifteen
Indefinite Time Terms Tested
in Five Reading Contexts

Table 16 reports student correct responses on the 15 items testing each indefinite time term in five reading contexts as indicated by their selection of both correct indefinite and definite meanings, only the correct

Table 16

Student Selection of Both Correct Indefinite and Definite Meanings, Only the Correct Indefinite Meaning, Only the Correct Definite Meaning on Fifteen Items Testing Each Indefinite Time Term in Five Reading Contexts

Reading Context	Student Selection					
	Column 1		Column 2		Column 3	
	Both Correct Indefinite and Definite Meanings	Only Correct Indefinite Meaning	Only Correct Definite Meaning	No.	%	No.
A ^a	1231	40.8	1671	55.4	2107	69.9
B ^b	1149	38.1	1514	50.2	2106	69.9
C ^c	1196	39.7	1472	48.8	2125	70.5
D ^d	960	31.8	1424	47.2	1735	57.6
E ^e	912	30.3	1349	44.7	1635	54.2

Note. The total possible number of student selections for each reading context as indicated in columns 1, 2 or 3 equals 3015 (201 x 15).

- ^a Vicarious experience before the subject's lifetime
- ^b Vicarious experience within the subject's lifetime but not within the last calendar year
- ^c Direct experience within the subject's lifetime but not within the last calendar year
- ^d Vicarious experience within the last calendar year of the subject's lifetime
- ^e Direct experience within the last calendar year of the subject's lifetime

indefinite meaning and only the correct definite meaning. The total number and percentage of students' correct answer choices for each of the five reading contexts as stated in chapter 1 are tabulated. Only limited differences between total student correct performance on 15 test items assessing each indefinite time term in one reading context and performance on test items testing the indefinite time terms in the other four reading contexts were evident. The following description of student performance considers those reading contexts in which the indefinite time terms were found to be the easiest and the most difficult to comprehend. The total number and percentage of both correct answer choices for indefinite time terms tested in reading contexts A and E differed from 1231 (40.8%) to 912 (30.3%), respectively, a difference of 10.5% (Column 1). Student selection of only correct indefinite meanings for indefinite time terms assessed in reading contexts A and E differed from 1671 (55.4%) to 1349 (44.7%), respectively, a difference of 10.7% (Column 2). Student selection of only correct definite meanings for indefinite time terms employed in reading contexts C and E differed from 2125 (70.5%) to 1635 (54.2%), respectively, a difference of 16.3% (Column 3). As revealed within each column of Table 16, student correct performance on items testing 15 indefinite time terms within one reading context did not, therefore,

differ from performance on those terms tested in the other four reading contexts by more than 16.3%.

Correct student response in columns 1, 2 and 3 (Table 16) also revealed a strong, consistent ordering of the reading contexts. With the exception of reading context B, column 1, and reading context C, column 3, difficulty of student understanding of the indefinite time terms increased from reading contexts A to E. Considering the research findings of Oakden and Sturt (1922), Bradley (1947) and Farrell (1953) suggesting greater student understanding of time concepts of a personal, immediate nature, an increase rather than decrease, in comprehension of the indefinite time terms presented in the five different contexts might be expected moving from context A to E. The opposite finding revealed by this study indicates student understanding of indefinite time terms employed in reading contexts considerably removed in time from the present and reflecting either a vicarious or direct experience to be greater than their comprehension of those terms expressed in context relating to either a vicarious or direct experience within the last calendar year. The more remote the reading context was from the present, therefore, the greater the students' comprehension of the indefinite time terms presented. This finding is supportive of McAulay's (1961) conclusion that the remote past is better understood by children

than the immediate past. Perhaps, then, the time aspect of each reading context had greater influence upon the comprehensibility of each time term tested therein rather than the direct or vicarious experience reflected in each test item.

As previously shown by both consideration of total student correct response on the ITT Test and student correct response for each indefinite time term tested, students of this study were more able to select a definite meaning for terms presented in any one of the five reading contexts than another indefinite meaning. Students were, as well, more able to express their understanding in another indefinite response than in both indefinite and definite meanings.

Correlation of Student Performance of Both
Correct Indefinite and Definite Meanings
with Verbal and Nonverbal Intelligence
Quotients, Word and Paragraph Meaning
Percentiles and Sex

The Pearson's product-moment coefficients of correlation were computed between student performance of both correct indefinite and definite meanings for the 15 indefinite time terms tested by the ITT Test and the variables verbal and nonverbal intelligence, reading ability as indicated by word and paragraph meaning percentiles and sex. Each variable whose relationship was examined will be considered individually.

Relationship between Student Performance
of Both Correct Meanings and Verbal
Intelligence Quotients

Coefficients of correlation between both correct meaning scores for each indefinite time term tested and verbal intelligence measures are shown in Table 17. The moderate degree of positive correlation reflects the expected relationship between performance on a reading comprehension test and verbal intellectual ability. The correlation coefficients were all significant at the .01 level of confidence.

Relationship between Student Performance
of Both Correct Meanings and Nonverbal
Intelligence Quotients

Table 18 presents the Pearson's product-moment coefficients of correlation obtained between both correct meaning scores for each indefinite term assessed and nonverbal intelligence quotients. Although the positive correlations were expectedly lower than those for verbal intelligence, the coefficients of correlation were again significant at the .01 confidence level.

The correlations between student performance of both correct indefinite and definite meanings for each of the 15 indefinite time terms tested by the ITT Test and student intelligence quotients revealed higher, positive correlation coefficients pertaining to verbal than to nonverbal measures. The positive, low to moderate degrees of correlation were, however, significant at the

Table 17

Coefficients of Correlation between Both Correct Meaning Scores for Each Indefinite Time Term Tested and Verbal Intelligence Quotients

Indefinite Time Terms	Coefficients of Correlation
as	.505
when	.473
new	.371
then	.483
now	.428
after	.461
before	.512
today	.424
soon	.402
still	.399
old	.494
during	.449
early	.461
until	.433
later	.478

Note. All coefficients were significant at the .01 level of confidence.

Table 18

Coefficients of Correlation between Both Correct
Meaning Scores for Each Indefinite Time Term
Tested and Nonverbal Intelligence Quotients

Indefinite Time Terms	Coefficients of Correlation
as	.428
when	.405
new	.373
then	.447
now	.362
after	.428
before	.400
today	.382
soon	.377
still	.349
old	.460
during	.412
early	.421
until	.355
later	.425

Note. All coefficients were significant at the .01 level
of confidence.

.01 level for both intelligence measures. These findings concur with those studies reviewed in chapter 2 which indicated a significant relationship between time concept development and intelligence (Farrell, 1953; Friedman & Marti, 1945; Harrison, 1934; Newman, 1967; Walker, 1968). The current findings are not supportive of those of Friedman (1944) who found I.Q. to contribute insignificantly to success on a reading comprehension test measuring a variety of time concepts.

Relationship between Student Performance
of Both Correct Meanings and Word and
Paragraph Meaning Percentiles

Table 19 reports the correlation coefficients between student correct response of both indefinite and definite meanings for the 15 time terms and student percentile placements on the Word and Paragraph Meaning sections of the Stanford Achievement Test, Form X, Intermediate 1.

The low to moderate degree of correlation between student performance of both correct meanings for the indefinite time terms tested by the ITT Test and students' reading abilities were similar considering both the standardized measures of word and paragraph meaning. All correlations were significant at the .01 level of confidence. These findings might be anticipated considering the design of the ITT Test to measure students' reading comprehension of 15 indefinite time terms.

Table 19

Coefficients of Correlation between Both Correct
 Meaning Scores for Each Indefinite Time Term
 Tested and Word and Paragraph
 Meaning Percentiles

Indefinite Time Terms	Coefficients of Correlation	
	Word Meaning Percentiles	Paragraph Meaning Percentiles
as	.448	.487
when	.414	.430
new	.334	.314
then	.468	.464
now	.413	.418
after	.404	.414
before	.466	.466
today	.375	.409
soon	.369	.389
still	.355	.396
old	.438	.470
during	.363	.365
early	.435	.429
until	.385	.382
later	.431	.469

Note. All coefficients were significant at the .01 level
 of confidence.

Relationship between Student Performance of Both Correct Meanings and Sex

Correlation coefficients between student performance of both correct indefinite and definite meanings for the 15 indefinite time terms tested and sex are shown in Table 20. The low degree of correlation found to exist between student performance and sex indicates a positive yet insignificant relationship between those variables. This finding is in concurrence with those of Farrell (1953), Friedman (1944), Friedman and Marti (1945), Newman (1967) and Walker (1968) who found sex to relate insignificantly to time concept test scores.

Summary of Findings

Statistical analyses of data produced the following findings:

1. The ITT Test was shown to be a reliable instrument for the measurement of reading comprehension of 15 selected indefinite time terms at the grade four level.
2. The majority of students were unable to select both correct indefinite and correct definite meanings simultaneously for nearly half or more of the test items.
3. Students were more able to express their understanding of an indefinite time term by selecting a definite rather than another indefinite meaning.

Table 20

Coefficients of Correlation between Both Correct Meaning Scores for Each Indefinite Time Term Tested and Sex

Indefinite Time Terms	Coefficients of Correlation
as	.023
when	.024
new	.036
then	.094
now	.068
after	.080
before	.073
today	.085
soon	.049
still	.117
old	.081
during	.020
early	.084
until	.031
later	.004

Note. Coefficients were not statistically significant.

Students were, however, more able to select another indefinite meaning before selecting both indefinite and definite meanings for an indefinite time term. This pattern of understanding was apparent considering total student correct responses on the ITT Test, student correct responses for each indefinite time term tested and student correct responses for 15 indefinite time terms tested in five reading contexts.

4. Although student understanding of an indefinite time term tested by a set of five items differed to a limited degree from that of every other set testing each of the other 14 terms, the order of the terms according to understanding was not consistent with the possible frequency of those terms in social studies materials.

5. Although student understanding of 15 indefinite time terms tested in one reading context differed to a limited degree from understanding of those terms tested in the other four contexts, the order of the reading contexts according to understanding of terms tested therein indicated understanding depended more upon the remoteness of the reading context from the present than the vicarious or direct experiential emphasis.

6. Verbal and nonverbal intelligence and word and paragraph comprehension were significant factors in fourth-grade students' reading comprehension of indefinite time terms.

7. Sex was not a significant factor in fourth-grade students' reading comprehension of indefinite time terms.

Chapter Summary

The findings of the current investigation reported in chapter 5 included reliability measures of the ITT Test and student correct response on the entire test instrument as well as correct response on the five items testing each indefinite time term and on the 15 terms tested in each of the five reading contexts. These findings, together with the relationships between students' reading comprehension of the indefinite time terms and their intellectual and reading abilities and their sex were summarized. A study summary given in chapter 6 precedes consideration of the findings, conclusions, implications and suggestions for further research.

Chapter 6

SUMMARY, FINDINGS, CONCLUSIONS, IMPLICATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

Summary

The purpose of this study was to investigate fourth-grade students' reading understanding of indefinite time terms by providing the opportunity in multiple-choice test items for students to choose two meanings simultaneously, indefinite and definite, for any one indefinite time term presented in social studies content. A definite time term was provided in the test item stem to focus and clarify meaning of the indefinite term. The nature of student understanding of each of 15 selected indefinite time terms was explored in sets of five items testing each indefinite term and in sets of 15 items testing each indefinite time term once in five different reading contexts. The study also examined the influence of selected variables of intelligence, reading ability and sex upon students' comprehension of indefinite time terms.

The Indefinite Time Term (ITT) Test, a 75-item dual-response multiple-choice instrument constructed for this investigation, was administered in two parts to 201 fourth-grade students aged 9 to 10 years enrolled in three middle-class urban elementary schools.

Correlations between student performance on Parts A and B were computed to assess student response consistency as a measure of reliability of the ITT Test. A custom item analysis program and Pearson's product-moment coefficients of correlation were used in statistical analyses of student performance to test the hypotheses of the study which are stated together with related findings in the following section.

Findings

Test Reliability

High, positive correlations beyond the .05 level of confidence were found to exist, independent of test part administration order, between student performance on Parts A and B. The distribution of scores as indicated by the means and standard deviations of student response from Part A to B and vice versa were shown to be similar.

Hypothesis 1

Hypothesis 1 stated: There is no adequate level of reading understanding by fourth-grade students (i.e. 50% or more) of 15 indefinite time terms presented in multiple-choice test items. That is, their correct answer choices will number less than 36 of the 75 test items (i.e. 48%) of any or all of:

- a) both correct indefinite and definite meanings,
- b) the correct indefinite meaning,

c) the correct definite meaning.

Approximately 1/3 of all students (34.8%) chose both correct indefinite and definite meanings in the presence of the other for 36 (48%) or more of the 75 test items.

Nearly 1/2 of all students (47.3%) were able to select the correct indefinite meaning for 36 or more test items.

Almost 3/4 of all subjects (72.6%) identified the correct definite meaning option for 36 or more test items.

Hypotheses 1a and 1b were therefore accepted and 1c was rejected.

Hypothesis 2

Hypothesis 2 stated: Total performance of all students on any set of five items that tests each indefinite time term will not differ by more than two. That is, the number of their correct answer choices on the five items testing one of the 15 indefinite time terms will not differ from any other five items testing one of the other 14 indefinite time terms by more than 40% as indicated by any or all of:

- a) both correct indefinite and definite meanings,
- b) the correct indefinite meaning,
- c) the correct definite meaning.

Limited differences of less than 40% were found to exist between total student selection of correct

responses on each set of five items testing one of the 15 indefinite time terms and student correct performance on most or all five items testing one of the 14 other indefinite time terms.

The percentage of both correct responses for the terms "before" and "soon" which were the best and least understood, respectively, differed from 43.9% to 28.4%, a difference of 15.5%.

The percentage of correct indefinite meanings for the terms "after" and "soon" differed from 60.5% to 38.3%, respectively, a difference of 22.2%.

The percentage of correct definite meaning responses for the terms "when" and "soon" differed from 72.9% to 52.7%, respectively, a difference of 20.2%.

The percentage difference of total student performance indicating both correct indefinite and definite meanings, only the correct indefinite meaning and only the correct definite meaning for the best and least understood of the indefinite time terms was less than the 40% stated in hypothesis 2.

Hypothesis 2 was therefore accepted.

Hypothesis 3

Hypothesis 3 stated: Total performance of all students on any set of 15 items that tests each indefinite time term once in each of the five reading contexts will not differ by more than six correct out of 15. That is,

the number of their correct answer choices for 15 indefinite time terms tested in one of the following reading contexts:

- A. Vicarious experience before the subject's lifetime,
- B. Vicarious experience within the subject's lifetime but not within the last calendar year,
- C. Direct experience within the subject's lifetime but not within the last calendar year,
- D. Vicarious experience within the last calendar year of the subject's lifetime,
- E. Direct experience within the last calendar year of the subject's lifetime

will not differ from any indefinite time term tested in the other four reading contexts by more than 40% as indicated by any or all of:

- a) both correct indefinite and definite meanings,
- b) the correct indefinite meaning,
- c) the correct definite meaning.

Limited differences of less than six correct out of 15 were shown between total student selection of correct responses on 15 test items testing each indefinite time term in one reading context and performance on test items assessing the indefinite time terms in the other four reading contexts.

The percentage of both correct responses for the indefinite time terms tested in the reading contexts concerned with vicarious experience before the subject's lifetime and direct experience within the last calendar year of the subject's lifetime which were the best and least understood contexts, respectively, differed from 40.8% to 30.3%, a difference of 10.5%.

The percentage of correct indefinite meanings for the indefinite time terms tested in the reading contexts stressing vicarious experience before the subject's lifetime and direct experience within the last calendar year of the subject's lifetime, the contexts in which the indefinite terms were the best and least understood, respectively, differed from 55.4% to 44.7%, a difference of 10.7%.

The percentage of correct definite meanings for the indefinite time terms assessed in the test item contexts reflecting direct experience within the subject's lifetime but not within the last calendar year and direct experience within the last calendar year of the subject's lifetime, the contexts in which the indefinite terms were the best and least understood, respectively, differed from 70.5% to 54.2%, a difference of 16.3%.

The percentage difference of total student performance indicating both correct indefinite and definite meanings, only the correct indefinite meaning and only

the correct definite meaning on any set of 15 items that tests each indefinite time term in one of five reading contexts did not differ from any of the other four sets of terms tested in the other four reading contexts by more than six out of 15 as stated in hypothesis 3.

Hypothesis 3 was therefore accepted.

Hypothesis 4

Hypothesis 4 stated: There is no significant correlation between the reading comprehension of 15 indefinite time terms by fourth-grade students as indicated by their total raw score on the ITT Test and any of the following variables:

- a) their percentile placement on the Word Meaning section of the Stanford Achievement Test, Form X, Intermediate 1,
- b) their percentile placement on the Paragraph Meaning section of the Stanford Achievement Test, Form X, Intermediate 1,
- c) their verbal I.Q. score on the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level A,
- d) their nonverbal I.Q. score on the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level A,
- e) their sex.

Coefficients of correlation between total student performance of both correct indefinite and definite

meaning scores on the ITT Test and student verbal and non-verbal intelligence measures and word and paragraph meaning percentiles were positively significant at the .01 level of confidence. Correlation coefficients between student performance of both correct indefinite and definite meanings for the 15 indefinite time terms tested and student sex were found to be positively but insignificantly related.

Hypotheses 4a, 4b, 4c and 4d were therefore rejected and 4e was accepted.

Conclusions

1. The Indefinite Time Term (ITT) Test was found to be a reliable instrument to measure fourth-grade students' reading understanding of selected indefinite time terms presented in social studies content.

2. As a group, the fourth-grade students of this study did not possess an adequate level of reading comprehension of selected indefinite time terms presented in multiple-choice test items as indicated by their inability to select both correct indefinite and definite meanings for each indefinite time term.

3. As a group, when given the opportunity to select two correct meanings for an indefinite time term, both the indefinite and definite meaning, the study sample performance indicated understanding may develop

from an ability to select the correct definite meaning, then to select the correct indefinite meaning and finally to select both correct meanings in the presence of the other.

4. Greater frequency of occurrence of an indefinite time term in social studies material does not ensure a greater understanding of that term.

5. Remoteness of the reading context from the present appears to have greater influence upon understanding of an indefinite time term than the direct or vicarious experiential emphasis of the context.

6. While verbal and nonverbal intelligence and word and paragraph comprehension are significant factors in fourth-grade students' reading comprehension of indefinite time terms, sex is not.

Implications

From the findings of this study and the conclusions drawn, the following implications are offered for children similar to those of the study sample:

1. Fourth-grade students are likely to be unable to comprehend indefinite time expressions encountered in reading social studies materials. Teachers should be aware of the difficulty indefinite time terms may exert upon comprehension of materials read independently by grade four students.

2. The frequency in which everyday words used as indefinite time terms occur in written materials should not be considered by the classroom teacher as indicative of their ease to be understood. Attention ought to be given to the meaning of frequently used indefinite time references as well as to those appearing less frequently.

3. Objective measurement of student comprehension of indefinite time terms is possible and might be used to assess level of understanding and to provide insight into appropriate instructional procedures based upon student strengths and needs. Students' understanding of indefinite time terms expressed in both indefinite and definite meanings might be objectively assessed using a multiple-choice test format similar to that of the ITT Test.

4. Lessons stressing meaning of indefinite time terms might first consider comprehension of those terms in definite time references before stressing meaning in other indefinite time terms.

5. Writers of literature and reference materials ought to consider use of definite time expressions to aid the reader's comprehension of time expressed indefinitely. Although indefinite and definite time references are both apparent in written materials, teachers selecting materials to be read independently by students should consider the extent to which definite time expressions that help to focus and clarify meaning

of indefinite time references are presented.

6. Those responsible for teacher education ought to stress that reading instruction be given in content areas such as social studies where indefinite time vocabulary, though frequently used, may not be understood within a particular context. Teachers should also receive instruction in evaluative and diagnostic teaching techniques to better assess student capabilities and to provide for their needs in this area.

Suggestions for Further Research

The findings of this investigation which strongly suggest a developmental sequence in comprehending an indefinite time term first in terms of a correct definite meaning, then a correct indefinite meaning before selection of both correct definite and indefinite meanings would seem to warrant further exploration. The suggested sequence might be examined further using an instrument similar to the ITT Test in format but different in content. Group studies, both at the grade four level and utilizing a wider range of grade levels, for example, grades two, four and six, might provide insight into the course of development of this possible sequence. In addition to group studies, a detailed analysis of individual performance and personal characteristics within a grade level or over a number of grade levels might be considered.

Further investigation of a conclusion from this study that remoteness of the reading context from the present seems to have greater influence upon understanding of an indefinite time term than the direct or vicarious experiential aspect of the context might be initiated. Attention could be given to the possible hardship encountered by the student in freeing himself from his immediate environment and from events directly experienced.

Reading comprehension of indefinite time terms by fourth-grade students, assessed in this research study in social studies content, might be further investigated in other areas such as science and literature.

Concluding Statement

Fourth-grade students' reading comprehension of selected indefinite time terms presented in social studies content in the presence of definite time terms of similar meaning was not adequate as indicated by their inability to select both correct indefinite and definite meanings for each selected time term. Students were not able to comprehend the relationship between the indefinite and definite meanings for each indefinite time term.

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APPENDICES

APPENDIX A

INDEFINITE TIME TERMS FOUND IN A CURSORY
EXAMINATION OF THREE SOCIAL STUDIES
REFERENCE MATERIALS USED BY
GRADE FOUR STUDENTS

Table A

Indefinite Time Terms Found in a Cursory Examination of Three Social Studies
Reference Materials Used by Grade Four Students

Indefinite Time Terms	No. in Ref. Aa	No. in Ref. Bb	No. in Ref. Cc	Total No.	Indefinite Time Terms	No. in Ref. Aa	No. in Ref. Bb	No. in Ref. Cc	Total No.
when	29	10	11	50	never	4	0	0	4
before	4	8	5	17	still	4	0	0	4
as	3	6	8	17	later	1	3	1	4
now	12	1	3	16	finally	3	0	0	3
then	4	5	3	12	during	0	3	3	3
until	7	1	3	11	always	3	0	0	3
after	4	3	3	10	since	0	2	2	2
once	4	0	3	7	recently	2	0	0	2
first	7	0	0	7	old	1	0	0	1
soon	6	1	0	7	gradually	0	1	1	1
early	4	2	0	6	afterward	0	1	1	1
sometimes	3	2	0	5	regularly	0	1	1	1
again	4	1	0	5	often	1	0	1	1
usually	2	2	0	4					
Total	93	42	39	174		19	12	0	31

^a Boon, I., & Boon, M. Alberta—western treasure chest. Calgary: Western Canada Institute Limited.

^b Ricker, M. B. Alberta. Toronto: Copp Clark Co. Limited, 1949.

^c Massey, D. L. An oil well near Edmonton. Canada: Ginn and Company, 1969.

APPENDIX B

TEST ITEM CONTENT WITHIN THE FIVE READING CONTEXTS

Test Item Content Within the Five
Reading Contexts

A. Vicarious experience before the subject's lifetime

1. Fort Edmonton completed in 1832.
2. North West Mounted Police arrived in Alberta on July 8, 1874.
3. Indian Treaty No. 7 signed on September 22, 1877.
4. Frank Slide occurred on April 29, 1903.
5. Alberta became a province on September 1, 1905.
6. Alberta Legislative Building opened on September 3, 1912.
7. High Level Bridge completed in 1912.
8. Natural gas found near Viking on November 4, 1914.
9. Social Credit came to power in Alberta in 1935.
10. Oil discovered near Leduc on February 13, 1947.
11. Interprovincial Pipeline from Edmonton to Eastern Canada finished in 1950.
12. Queen Elizabeth Planetarium opened in October, 1960.
13. Air pollution regulations passed in Alberta in 1961.
14. Fort McMurray tar sands plant development started in 1964.
15. Greater number of urban than rural Albertans in 1964.

B. Vicarious experience within the subject's lifetime but not within the last calendar year

1. Edmonton's summer fair became Klondike Days in July, 1966.
2. CN Tower Building opened in 1966.
3. Glenrose School Hospital opened in September, 1966.
4. Premier Manning retired in December, 1968.
5. Development of Grande Cache began on March 7, 1969.
6. Alberta Resources Railway opened on May 28, 1969.
7. Man first landed on the moon on July 20, 1969.
8. First coal shipment left Grande Cache for Japan on April 8, 1970.
9. Grant MacEwan Community College named on August 26, 1970.
10. Building of pulp mill near Grande Prairie started on May 27, 1971.
11. Progressive Conservative government elected in Alberta on August 30, 1971.
12. Decision to hold British Commonwealth Games in Edmonton made in January, 1972.
13. Fort Edmonton Park opened on May 9, 1972.
14. Yellowhead Highway became major mountain road in 1972.
15. Plants cleaned from Lake Wabamun in 1972.

C. Direct experience within the subject's lifetime but not within the last calendar year

1. Learning to walk alone in June, 1966.
2. Learning to talk in sentences in November, 1967.
3. Learning to swing in June, 1968.
4. Fifth birthday in April, 1970.
5. Loss of first tooth in April, 1971.
6. Learning to ride a bicycle in July, 1971.
7. Starting school on September 1, 1971.
8. Learning to print in September, 1971.
9. Learning to read in September, 1971.
10. Learning to print one's name in September, 1971.
11. Sixth birthday in October, 1971.
12. Learned of no Santa Claus in December, 1971.
13. First spelling test in September, 1972.
14. Learning to tell time in November, 1972.
15. Learning to write in October, 1973.

Note. Definite dates were arbitrarily assigned by the researcher in accordance with references on child development (Bowley, 1957; Breckenridge & Murphy, 1969; Gardner, 1973).

D. Vicarious experience within the last calendar year of the subject's lifetime.

1. Team Canada lost hockey series to Russian team in October, 1974.
2. Digging of Edmonton's Rapid Transit line started in October, 1974.
3. William Hawrelak elected Mayor of Edmonton on October 16, 1974.
4. Price of milk in Alberta increased on November 1, 1974.
5. Edmonton Coliseum opened on November 10, 1974.
6. Safeway meat cutters' strike began on November 22, 1974.
7. Edmonton Eskimos lost Grey Cup Game on November 25, 1974.
8. Wardair decided to keep main office in Edmonton on December 3, 1974.
9. Price of natural gas in Alberta went up on January 1, 1975.
10. Calgary celebrated one hundred years as a city on January 29, 1975.
11. Government decision to invest money in Fort McMurray tar sands project on February 5, 1975.
12. Canada Winter Games held in Alberta in February, 1975.
13. Progressive Conservative government elected in

Alberta on March 26, 1975.

14. Wagon train left Ontario for Alberta on April 1, 1975.
15. Vietnamese orphans arrived in Canada in April, 1975.

- E. Direct experience within the last calendar year of the subject's lifetime
 - 1. Dinner on Thanksgiving Sunday, October 12, 1974.
 - 2. Dressing up on Hallowe'en, October 31, 1974.
 - 3. Wearing poppies on Remembrance Day, November 11, 1974.
 - 4. Christmas holidays started on December 20, 1974.
 - 5. First big snowstorm of the winter on December 21, 1974.
 - 6. New Year's Day on January 1, 1975.
 - 7. Valentine party on St. Valentine's Day, February 14, 1975.
 - 8. School closed for Teachers' Convention on February 20 and 21, 1975.
 - 9. Wearing of green on St. Patrick's Day, March 17, 1975.
 - 10. Change to Celsius temperature scale on April 1, 1975.
 - 11. Tricks played on April Fool's Day, April 1, 1975.
 - 12. Easter holidays ended on April 5, 1975.
 - 13. Turning clocks ahead one hour for Daylight Saving Time on April 27, 1975.
 - 14. Remembering Mother on Mother's Day, May 11, 1975.
 - 15. Family outing on long weekend of May 16, 1975.

APPENDIX C
TEST ITEM DISTRACTOR EXERCISE

Test Item Distractor Exercise

Directions: Read each question carefully. Ask the teacher to pronounce any capitalized word that you can not read. In your own words, write the meaning of the underlined word in each sentence.

Samples: The Canadian National Railway came to Edmonton in 1905. The CN Railway recently came to Edmonton.

Recently means

The price of bread went up recently. In April, 1975 the price of bread went up.

Recently means

1. Teddy did not walk by himself until he was ready. He started to walk alone in June, 1966.

Until means

2. Laws to keep Alberta's air clean were passed in 1961. Many people were happy as the laws were passed.

As means

3. In July, 1971, Kenny was learning to ride his bicycle.
He was still finding it hard to keep from falling.
Still means

Note. The exercise consisted of 72 other test item stems which were incorporated into the Indefinite Time Term (ITT) Test.

APPENDIX D

QUESTIONS ASKED OF SELECTED STUDENTS FOLLOWING
TEST ITEM DISTRACTOR EXERCISE

Questions Asked of Selected Students Following
Test Item Distractor Exercise

A. General Format of Test Items

1. Did you find the questions hard to read? If so, what made the questions hard for you to read?
2. Could you understand what you read? If not, what made the questions hard for you to understand?
3. Did you find it hard to write a meaning for any underlined word or words? If so, which underlined word or words caused you difficulty in writing a meaning?
4. Did you find the exercise too long? If so, what do you think made it seem too long?

B. Content - Direct Experiences

1. Have you lived in Edmonton since last September? If not, when did you move to Edmonton?
2. Have you ever had school friends over to your home for a birthday party? In Grade One? In Grade Four?
3. Did you go to the Grey Cup Game in Vancouver in November, 1974?
4. Can you swing? If so, when did you learn to swing?
5. Were you in Calgary to celebrate Calgary's one hundredth birthday?
6. Have you gone with your family to visit friends

within the last year?

7. Did your family have a turkey dinner for Thanksgiving last October?

APPENDIX E

INDEFINITE TIME TERM TEST
TEACHER DIRECTIONS

INDEFINITE TIME TERM TEST

Teacher Directions

The seventy-five item multiple-choice test consists of two parts, A and B. The two parts are to be administered in two morning sittings of approximately forty (40) minutes each on consecutive days. Some students will be randomly assigned to begin with Part A whereas others will start with Part B. The reverse will occur the following day.

Pencils and erasers are required to indicate answers on test booklets. File cards (3" x 5") are provided to aid student response to each test item option.

The following procedure is required for the administration of both Part A and B:

- 1) Make sure each student has a sharp pencil and an eraser.
- 2) Pass out designated test section and file card to each student, placing test booklet face down on the desk.
- 3) Ask students to turn over the test booklets. Say, "The name of the test you are taking this morning is the Indefinite Time Term Test. Some of you will have Part A while others will have Part B."
- 4) Have students write first and last names and

indicate other data as required.

- 5) Read entire direction page to students, adding the following where appropriate:
 - a) Instruct students to raise hand throughout the test for assistance with any capitalized words. No assistance is to be given to noncapitalized words.
 - b) After reading Example A to the students, ask, "Which word is underlined?" Continue with, "We are now going to choose the two best meanings for 'recently' as it is used in the sentence." Instruct students to place the file card under option 'a' so that the phrase and Yes and No choices are in view. Read, "Recently means - many years ago," and ask the students to circle Yes or No. Have students slide the file card under option 'b'. Read, "Recently means - came to Edmonton," again asking students to circle Yes or No. Do the same for options 'c', 'd' and 'e'. After the students have answered 'a', 'b', 'c', 'd' and 'e' options, ask, "How many have circled two (2) Yes answers and three (3) No answers?"

MAKE SURE ALL HANDS ARE RAISED HOWEVER DO

NOT INDICATE WHETHER STUDENT CHOICES ARE
RIGHT OR WRONG. DO NOT TEACH OR OFFER
EXPLANATION.

c) After reading Example B to the students, ask, "Which word is underlined?" Continue with, "We are now going to choose the two best meanings for 'recently' as it is used in the sentence." Instruct students to place the file card under option 'a' so that the phrase and Yes and No choices are in view. Read, "Recently means - the prices went up," and ask the students to circle Yes or No. Have students slide the file card under option 'b'. Read, "Recently means - a year ago," again asking students to circle Yes or No. Do the same for options 'c', 'd' and 'e'. After the students have answered 'a', 'b', 'c', 'd' and 'e' options, ask, "How many have circled two (2) Yes answers and three (3) No answers?"

MAKE SURE ALL HANDS ARE RAISED HOWEVER DO NOT INDICATE WHETHER STUDENT CHOICES ARE RIGHT OR WRONG. DO NOT TEACH OR OFFER EXPLANATION.

6) Encourage students to complete all test items

and to check for two (2) Yes responses and three (3) No responses for each question when finished.

- 7) Record the time when students begin the test and indicate the completion time on each test booklet as the student hands it in. Encourage students to take as much time as needed, up to eighty (80) minutes for each test part.

APPENDIX F

INDEFINITE TIME TERM TEST

PART A

INDEFINITE TIME TERM TEST

Part A

Student's Name: _____

School: _____

Sex (Circle): Male Female

Directions: Read each test question carefully. Ask the teacher to pronounce any capitalized words that you can not read.

Place the file card under each of the five meanings given for the underlined word in each test question. Circle Yes or No for each given meaning. Circle Yes for the two (2) best answers.

Examples: A. The Canadian National Railway came to Edmonton in 1905. The CN Railway recently came to Edmonton.

Recently means

a. many years ago	Yes	No
b. came to Edmonton	Yes	No
c. the last few months	Yes	No
d. seventy years ago	Yes	No
e. five years ago	Yes	No

B. The price of bread went up recently. In April, 1975, the price of bread went up.

Recently means

a. the price went up	Yes	No
b. a year ago	Yes	No
c. six months ago	Yes	No
d. many years ago	Yes	No
e. several months ago	Yes	No

Read carefully and take all the time you need.

Remember to circle Yes or No for each meaning, choosing Yes for the two (2) best answers. Turn the page and begin at Question 1.

Note. The correct responses for each test item have been circled.

1. Teddy did not walk by himself until he was ready. He started to walk alone in June, 1966.

Until means

a. nine years ago	<input checked="" type="radio"/> Yes	No
b. the last few months	Yes	No
c. to wait a while	Yes	No
d. fifteen years ago	Yes	No
e. several years ago	<input checked="" type="radio"/> Yes	No

2. Laws to keep Alberta's air clean were passed in 1961. Many people were happy as the laws were passed.

As means

a. fourteen years ago	<input checked="" type="radio"/> Yes	No
b. the last few months	Yes	No
c. many years ago	<input checked="" type="radio"/> Yes	No
d. to keep Alberta clean	Yes	No
e. seven years ago	Yes	No

3. In July, 1971, Kenny was learning to ride his bicycle. He was still finding it hard to keep from falling.

Still means

a. a few years ago	<input checked="" type="radio"/> Yes	No
b. to keep from falling	Yes	No
c. four years ago	<input checked="" type="radio"/> Yes	No
d. three months ago	Yes	No
e. the last few months	Yes	No

4. At a meeting on February 5, 1975, money was offered to keep the Fort McMurray oil sands plant working. Money was offered during the meeting.

During means

a. the money was given	Yes	No
b. two months ago	Yes	No
c. several months ago	<input checked="" type="radio"/> Yes	No
d. nine months ago	<input checked="" type="radio"/> Yes	No
e. many years ago	Yes	No

5. Glenrose School Hospital opened in September, 1970. Children with special problems then had a school of their own.

Then means

a. several years ago	<input checked="" type="radio"/>	Yes	No
b. fourteen years ago	<input type="radio"/>	Yes	No
c. had their own school	<input type="radio"/>	Yes	No
d. a few weeks ago	<input type="radio"/>	Yes	No
e. five years ago	<input checked="" type="radio"/>	Yes	No

6. The people of Alberta now had a government building. The Legislative Building was opened on September 3, 1912.

Now means

a. sixty-three years ago	<input checked="" type="radio"/>	Yes	No
b. a few years ago	<input type="radio"/>	Yes	No
c. nine years ago	<input type="radio"/>	Yes	No
d. had a government building	<input type="radio"/>	Yes	No
e. many years ago	<input checked="" type="radio"/>	Yes	No

7. It is old news that many Progressive Conservatives were chosen by the people of Alberta to form a government. Many Progressive Conservatives were chosen on March 26, 1975.

Old means

a. many years ago	Yes	No
b. seven months ago	<input checked="" type="radio"/>	No
c. three months ago	<input type="radio"/>	No
d. several months ago	<input checked="" type="radio"/>	No
e. everyone knew the news	Yes	No

8. The Christmas holidays started on December 20, 1974. School was then closed for two weeks.

Then means

a. several months ago	<input checked="" type="radio"/>	No
b. Christmas holidays started	<input type="radio"/>	No
c. two months ago	<input type="radio"/>	No
d. many years ago	<input type="radio"/>	No
e. ten months ago	<input checked="" type="radio"/>	No

9. An old newspaper story said Mr. Manning stepped down as Premier of Alberta. He stepped down as Premier in December, 1968.

Old means

a. dirty and used	Yes	No
b. seven years ago	<input checked="" type="radio"/> Yes	No
c. several years ago	<input checked="" type="radio"/> Yes	No
d. a few months ago	Yes	No
e. eighteen years ago	Yes	No

10. On January 29, 1975, Calgary had a birthday party. Calgary had a party after one hundred years as a city.

After means

a. many years ago	Yes	No
b. seven years ago	Yes	No
c. several months ago	<input checked="" type="radio"/> Yes	No
d. nine months ago	<input checked="" type="radio"/> Yes	No
e. one hundred years	Yes	No

11. The streets were later covered with snow from the first big storm. The first big storm of the winter came on December 21, 1974.

Later means

a. it snowed in December	Yes	No
b. three months ago	Yes	No
c. a few weeks ago	Yes	No
d. several months ago	<input checked="" type="radio"/> Yes	No
e. ten months ago	<input checked="" type="radio"/> Yes	No

12. Jimmy put his tongue in the new space between two teeth. He had lost his first tooth in April, 1971.

New means

a. six months ago	Yes	No
b. a few years ago	<input checked="" type="radio"/> Yes	No
c. many years ago	Yes	No
d. four years ago	<input checked="" type="radio"/> Yes	No
e. space between teeth	Yes	No

13. Natural gas was found in Alberta today. Natural gas was found near Viking on November 4, 1914.

Today means

a. natural gas was found	Yes	No
b. many years ago	<input checked="" type="radio"/> Yes	No
c. sixty-one years ago	<input checked="" type="radio"/> Yes	No
d. eleven months ago	Yes	No
e. many months ago	Yes	No

14. Grant MacEwan College was named in August, 1970. It was still not known where it would be built.

Still means

a. five years ago	<input checked="" type="radio"/> Yes	No
b. twelve years ago	Yes	No
c. a few months ago	Yes	No
d. did not know	Yes	No
e. several years ago	<input checked="" type="radio"/> Yes	No

15. Edmonton became the capital of Alberta after Alberta became a province. Alberta became a province on September 1, 1905.

After means

a. many years ago	<input checked="" type="radio"/> Yes	No
b. seventy years ago	<input checked="" type="radio"/> Yes	No
c. several weeks ago	Yes	No
d. five years ago	Yes	No
e. Alberta became a province	Yes	No

16. Milk will cost more money today. The price of milk will go up on November 1, 1974.

Today means

a. a few weeks ago	Yes	No
b. many months ago	<input checked="" type="radio"/> Yes	No
c. eleven months ago	<input checked="" type="radio"/> Yes	No
d. the present day	Yes	No
e. price will go up	Yes	No

17. The digging of Edmonton's Rapid Transit line started in October, 1974. Many plans were made before the digging began.

Before means

a. a few weeks ago	Yes	No
b. a year ago	<input checked="" type="radio"/>	No
c. five years ago	Yes	No
d. many months ago	<input checked="" type="radio"/>	No
e. the digging began	Yes	No

18. Tom started school in September, 1971. He learned to print his name when he started school.

When means

a. four years ago	<input checked="" type="radio"/>	No
b. a few years ago	<input checked="" type="radio"/>	No
c. he started school	Yes	No
d. last month	Yes	No
e. several weeks ago	Yes	No

19. Jack later learned to tell time. He learned to tell time in November, 1972.

Later means

a. three years ago	<input checked="" type="radio"/>	No
b. a few years ago	<input checked="" type="radio"/>	No
c. learned to tell time	Yes	No
d. eleven months ago	Yes	No
e. in a few weeks	Yes	No

20. April 1, 1975 was April Fool's Day. Children played tricks on each other during the day.

During means

a. a few years ago	Yes	No
b. three months ago	Yes	No
c. several months ago	<input checked="" type="radio"/>	No
d. children played tricks	Yes	No
e. six months ago	<input checked="" type="radio"/>	No

21. The Alberta Resources Railway between Edmonton and Grande Prairie was opened on May 28, 1969. People spoke to the crowd during the opening.

During means

a. six years ago	<input checked="" type="radio"/> Yes	No
b. the last several months	Yes	No
c. thirteen years ago	Yes	No
d. several years ago	<input checked="" type="radio"/> Yes	No
e. the opening	Yes	No

22. A new town in northern Alberta was being built. Work began on the town of Grande Cache on March 7, 1969.

New means

a. several years ago	<input checked="" type="radio"/> Yes	No
b. seven months ago	Yes	No
c. six years ago	<input checked="" type="radio"/> Yes	No
d. just built	Yes	No
e. several months ago	Yes	No

23. People waited until the Queen Elizabeth Planetarium was opened. It opened in October, 1960.

Until means

a. a year ago	Yes	No
b. many years ago	<input checked="" type="radio"/> Yes	No
c. fifteen years ago	<input checked="" type="radio"/> Yes	No
d. in a few days	Yes	No
e. people waited	Yes	No

24. Mary gave Mother flowers on Mother's Day, May 11, 1975. Mother put the flowers in water after Mary gave them to her.

After means

a. Mary gave them	Yes	No
b. five months ago	<input checked="" type="radio"/> Yes	No
c. a few weeks ago	Yes	No
d. several months ago	<input checked="" type="radio"/> Yes	No
e. a year ago	Yes	No

25. The building of the Pulp Mill near Grande Prairie was started later. Work started on May 27, 1971.

Later means

a. in several months	Yes	No
b. a few years ago	Yes	No
c. work started	Yes	No
d. in eight months	Yes	No
e. four years ago	Yes	No

26. Indian Treaty Number Seven was signed on September 22, 1877. The new law set aside land for the Indians.

New means

a. a few years ago	Yes	No
b. seven years ago	Yes	No
c. many years ago	Yes	No
d. ninety-eight years ago	Yes	No
e. was just made	Yes	No

27. The people of Alberta chose Social Credit to form a government on September 3, 1935. Social Credit came to power in Alberta during the 1930's.

During means

a. five years ago	Yes	No
b. forty years ago	Yes	No
c. came to power	Yes	No
d. a few years ago	Yes	No
e. many years ago	Yes	No

28. A line of pipe to carry oil from Edmonton to Eastern Canada was finished in 1950. The old line has been made even longer.

Old means

a. made even longer	Yes	No
b. eight years ago	Yes	No
c. twenty-five years ago	Yes	No
d. many years ago	Yes	No
e. the last few years	Yes	No

29. Edmonton's summer fair will soon have a new name. In July, 1966, Edmonton's summer fair will be called Klondike Days.

Soon means

a. in several months	Yes	No
b. will have a new name	Yes	No
c. nine years ago	Yes	No
d. in ten months	Yes	No
e. several years ago	Yes	No

30. Tommy had his fifth birthday in early spring. He had his birthday on April 6, 1970.

Early means

a. in the month	Yes	No
b. six months ago	Yes	No
c. several years ago	Yes	No
d. five years ago	Yes	No
e. several months ago	Yes	No

31. The price of natural gas went up on January 1, 1975. The people of Alberta then paid more to heat their homes.

Then means

a. a year ago	Yes	No
b. ten months ago	Yes	No
c. a few weeks ago	Yes	No
d. paid more money	Yes	No
e. several months ago	Yes	No

32. The High Level Bridge was finished in 1912. The crowd shouted when the bridge was finished.

When means

a. many years ago	Yes	No
b. sixty-three years ago	Yes	No
c. the bridge was finished	Yes	No
d. nine years ago	Yes	No
e. a few years ago	Yes	No

33. Ann could remember feeling excited during her first day at school. Ann started school on September 1, 1971.

During means

a. day at school	Yes	No
b. four years ago	Yes	No
c. one month ago	Yes	No
d. the last several weeks	Yes	No
e. a few years ago	Yes	No

34. The town of Frank was later covered by a rock slide. Turtle Mountain came down upon the town of Frank on April 29, 1903.

Later means

a. six months ago	Yes	No
b. covered by a rock slide	Yes	No
c. several months ago	Yes	No
d. many years ago	Yes	No
e. seventy-two years ago	Yes	No

35. Jane like to swing after she learned to hold on. She learned to hold on in June, 1968.

After means

a. four months ago	Yes	No
b. several years ago	Yes	No
c. she learned	Yes	No
d. seven years ago	Yes	No
e. a few months ago	Yes	No

36. People will wear poppies on Remembrance Day, November 11, 1974. They will soon be wearing poppies.

Soon means

a. eleven months ago	Yes	No
b. many months ago	Yes	No
c. in one month	Yes	No
d. in a few weeks	Yes	No
e. be wearing poppies	Yes	No

37. It was October 31, 1974. Mary and Jane were dressed like black cats when they called, "Hallowe'en Apples."

When means

a. a year ago	<input checked="" type="radio"/> Yes	No
b. in one month	<input type="radio"/> Yes	No
c. many months ago	<input checked="" type="radio"/> Yes	No
d. in a few months	<input type="radio"/> Yes	No
e. they were black cats	<input type="radio"/> Yes	No

APPENDIX G
INDEFINITE TIME TERM TEST
PART B

INDEFINITE TIME TERM TEST

Part B

Student's Name: _____

School: _____

Sex (Circle): Male Female

Directions: Read each test question carefully. Ask the teacher to pronounce any capitalized words that you can not read.

Place the file card under each of the five meanings given for the underlined word in each test question. Circle Yes or No for each given meaning. Circle Yes for the two (2) best answers.

Examples: A. The Canadian National Railway came to Edmonton in 1905. The CN Railway recently came to Edmonton.

Recently means

a. many years ago	Yes	No
b. came to Edmonton	Yes	No
c. the last few months	Yes	No
d. seventy years ago	Yes	No
e. five years ago	Yes	No

B. The price of bread went up recently. In April, 1975, the price of bread went up.

Recently means

a. the price went up	Yes	No
b. a year ago	Yes	No
c. six months ago	Yes	No
d. many years ago	Yes	No
e. several months ago	Yes	No

Read carefully and take all the time you need.

Remember to circle Yes or No for each meaning, choosing Yes for the two (2) best answers. Turn the page and begin at Question 1.

Note. The correct responses for each test item have been circled.

1. In early spring a wagon train started out to Alberta from Ontario. It left on April 1, 1975.

Early means

a. several months ago	<input checked="" type="checkbox"/> Yes	No
b. a year ago	Yes	No
c. a few weeks ago	Yes	No
d. six months ago	<input checked="" type="checkbox"/> Yes	No
e. they started out	Yes	No

2. Edmonton has another park today. Fort Edmonton Park was opened on May 9, 1972.

Today means

a. a few years ago	<input checked="" type="checkbox"/> Yes	No
b. several months ago	Yes	No
c. three years ago	<input checked="" type="checkbox"/> Yes	No
d. Fort Edmonton opened	Yes	No
e. five months ago	Yes	No

3. Sue was not interested in books before she started to learn to read. Sue started to learn to read in September, 1971.

Before means

a. four years ago	<input checked="" type="checkbox"/> Yes	No
b. one month ago	Yes	No
c. several weeks ago	Yes	No
d. not interested in books	Yes	No
e. a few years ago	<input checked="" type="checkbox"/> Yes	No

4. John's parents were listening to an old tape recording of John first talking in sentences. He started to talk in sentences in November, 1967.

Old means

a. eight years ago	<input checked="" type="checkbox"/> Yes	No
b. eleven months ago	Yes	No
c. a tape recording	Yes	No
d. several years ago	<input checked="" type="checkbox"/> Yes	No
e. many months ago	Yes	No

5. Betty can write now. She learned to write in October, 1973.

Now means

a. many months ago	<input checked="" type="radio"/>	Yes	No
b. the present day	<input type="radio"/>	Yes	No
c. Betty can write	<input type="radio"/>	Yes	No
d. a few days ago	<input type="radio"/>	Yes	No
e. two years ago	<input checked="" type="radio"/>	Yes	No

6. The first coal from Grande Cache left by train on April 8, 1970. The coal was sent to Japan after it left Grande Cache.

After means

a. coal left Grande Cache	<input type="radio"/>	Yes	No
b. five years ago	<input checked="" type="radio"/>	Yes	No
c. several years ago	<input checked="" type="radio"/>	Yes	No
d. six months ago	<input type="radio"/>	Yes	No
e. several months ago	<input type="radio"/>	Yes	No

7. The Canada Winter Games are being held in Alberta in February, 1975. The Games are still on.

Still means

a. several months ago	<input checked="" type="radio"/>	Yes	No
b. games are going on	<input type="radio"/>	Yes	No
c. eight months ago	<input checked="" type="radio"/>	Yes	No
d. the present day	<input type="radio"/>	Yes	No
e. many years ago	<input type="radio"/>	Yes	No

8. Bobby had his sixth birthday on October 15, 1971. His school friends sang "Happy Birthday" to him then.

Then means

a. four years ago	<input checked="" type="radio"/>	Yes	No
b. a few years ago	<input checked="" type="radio"/>	Yes	No
c. the present month	<input type="radio"/>	Yes	No
d. the last several days	<input type="radio"/>	Yes	No
e. sang "Happy Birthday"	<input type="radio"/>	Yes	No

9. Mr. Lougheed was chosen Premier of Alberta on August 30, 1971. No Progressive Conservative had ever been Premier before he was chosen.

Before means

a. a few months ago	Yes	No
b. four years ago	<input checked="" type="radio"/> Yes	No
c. he was chosen	Yes	No
d. two months ago	Yes	No
e. a few years ago	<input checked="" type="radio"/> Yes	No

10. All the children chose something green to wear on March 17, 1975. Johnny wore his new green shirt on St. Patrick's Day.

New means

a. a year ago	Yes	No
b. several months ago	<input checked="" type="radio"/> Yes	No
c. several days ago	Yes	No
d. seven months ago	<input checked="" type="radio"/> Yes	No
e. he just bought it	Yes	No

11. Children from Vietnam came to Canada in April, 1975. They met their new parents as they arrived.

As means

a. they arrived	Yes	No
b. six months ago	<input checked="" type="radio"/> Yes	No
c. several months ago	<input checked="" type="radio"/> Yes	No
d. a year ago	Yes	No
e. a few days ago	Yes	No

12. The Easter holidays ended on April 5, 1975. Children were sad as the end of the holidays came.

As means

a. the last few days	Yes	No
b. several months ago	<input checked="" type="radio"/> Yes	No
c. the end of holidays	Yes	No
d. in five months	Yes	No
e. six months ago	<input checked="" type="radio"/> Yes	No

13. The pupils had a party on St. Valentine's Day, February 14, 1975. The valentines were kept in a box until the party began.

Until means

a. the last several days	Yes	No
b. eight months ago	Yes	No
c. several months ago	Yes	No
d. in four months	Yes	No
e. the pupils waited	Yes	No

14. The Grade Two pupils were having their first spelling test today. On September 10, 1972, the second grade children were ready for their first spelling test.

Today means

a. a few years ago	Yes	No
b. a few months ago	Yes	No
c. the present day	Yes	No
d. first spelling test	Yes	No
e. three years ago	Yes	No

15. The Green family was having turkey for dinner today. They were having turkey for dinner on Thanksgiving Sunday, October 12, 1974.

Today means

a. a year ago	Yes	No
b. many months ago	Yes	No
c. a few weeks ago	Yes	No
d. eight months ago	Yes	No
e. having turkey for dinner	Yes	No

16. The Teachers' Convention is on February 20 and 21, 1975. The schools are closed now.

Now means

a. the last few days	Yes	No
b. eight months ago	Yes	No
c. schools are closed	Yes	No
d. several months ago	Yes	No
e. the present day	Yes	No

17. Fort Edmonton was completed in 1832. It was then a busy fur trading post.

Then means

a. the last few years	Yes	No
b. nine years ago	Yes	No
c. one hundred forty-three years ago	Yes	No
d. many years ago	Yes	No
e. trading post was busy	Yes	No

18. In 1964 most of the people in Alberta were living in cities or towns. However, many people still lived on farms.

Still means

a. a few months ago	Yes	No
b. many years ago	Yes	No
c. living on farms	Yes	No
d. eleven years ago	Yes	No
e. the present day	Yes	No

19. On December 3, 1974, Wardair Airlines decided to keep its main office in Edmonton. The new plan was good news for the people of Edmonton.

New means

a. plan was good news	Yes	No
b. ten months ago	Yes	No
c. a year ago	Yes	No
d. several months ago	Yes	No
e. a few years ago	Yes	No

20. Hockey was not played in the Edmonton Coliseum until it was opened. The Coliseum was opened on November 10, 1974.

Until means

a. the last few weeks	Yes	No
b. the Coliseum opened	Yes	No
c. eleven months ago	Yes	No
d. many months ago	Yes	No
e. in a month	Yes	No

21. On May 16, 1975, the Smith family went to visit their friends. Mr. Smith washed the car before they left.

Before means

a. five months ago	<input checked="" type="checkbox"/> Yes	No
b. a few weeks ago	Yes	No
c. last week	Yes	No
d. washed the car	Yes	No
e. several months ago	<input checked="" type="checkbox"/> Yes	No

22. In early January we started another year. New Year's Day was January 1, 1975.

Early means

a. a year ago	Yes	No
b. several months ago	<input checked="" type="checkbox"/> Yes	No
c. ten months ago	<input checked="" type="checkbox"/> Yes	No
d. a few weeks ago	Yes	No
e. the new year	Yes	No

23. The Edmonton Eskimos have now lost the Grey Cup Game. The Grey Cup Game was played on November 25, 1974.

Now means

a. eleven months ago	<input checked="" type="checkbox"/> Yes	No
b. the present day	Yes	No
c. a few weeks ago	Yes	No
d. many months ago	<input checked="" type="checkbox"/> Yes	No
e. they lost the game	Yes	No

24. Two men landed on the moon in July, 1969. People all over the world were interested in that early space adventure.

Early means

a. the last few months	Yes	No
b. a year ago	Yes	No
c. space adventure	Yes	No
d. six years ago	<input checked="" type="checkbox"/> Yes	No
e. several years ago	<input checked="" type="checkbox"/> Yes	No

25. The Yellowhead Highway became a main road through the mountains in 1972. There was now another highway between Alberta and British Columbia.

Now means

a. the present day	Yes	No
b. another highway	Yes	No
c. three years ago	Yes	No
d. a few years ago	Yes	No
e. several months ago	Yes	No

26. Tommy soon knew there was no Santa Claus. In December, 1971, Tommy learned there was no Santa Claus.

Soon means

a. a few years ago	Yes	No
b. four years ago	Yes	No
c. in two months	Yes	No
d. began to know	Yes	No
e. several months ago	Yes	No

27. No buildings were planned until it was decided that the British Commonwealth Games would be held in Edmonton. It was decided in January, 1972, that the Games would be held in Edmonton.

Until means

a. three years ago	Yes	No
b. many weeks ago	Yes	No
c. it was decided	Yes	No
d. a few years ago	Yes	No
e. ten months ago	Yes	No

28. Team Canada later lost to the Russians. Canada's hockey team lost to the Russians in October, 1974.

Later means

a. a year ago	Yes	No
b. many months ago	Yes	No
c. in a few days	Yes	No
d. lost to the Russians	Yes	No
e. the present month	Yes	No

29. The men who cut meat in Safeway stores will soon go on strike. They will go on strike on November 22, 1974.

Soon means

a. in a month	Yes	No
b. eleven months ago	Yes	No
c. many months ago	Yes	No
d. in a few weeks	Yes	No
e. will go on strike	Yes	No

30. Oil was found near Leduc on February 13, 1947. That early discovery of oil helped to make Alberta rich.

Early means

a. twenty-eight years ago	Yes	No
b. seven years ago	Yes	No
c. many years ago	Yes	No
d. the last few months	Yes	No
e. discovery of oil	Yes	No

31. Bobby found an old newspaper telling people to set their clocks ahead one hour. We set our clocks ahead one hour on April 27, 1975.

Old means

a. many years ago	Yes	No
b. six months ago	Yes	No
c. a newspaper	Yes	No
d. several months ago	Yes	No
e. a week ago	Yes	No

32. Plants were cleaned from Lake Wabamun in 1972. The lake was safe for swimming as the plants were taken out.

As means

a. several months ago	Yes	No
b. a few years ago	Yes	No
c. plants were taken out	Yes	No
d. twelve years ago	Yes	No
e. three years ago	Yes	No

33. On April 1, 1975, temperatures were recorded in Celsius. People were still not ready for the change.

Still means

a. six months ago	<input checked="" type="radio"/> Yes	No
b. the last few days	Yes	No
c. many weeks ago	<input checked="" type="radio"/> Yes	No
d. were not ready	Yes	No
e. a year ago	Yes	No

34. The North West Mounted Police arrived in Alberta on July 8, 1874. There were no police to keep law and order before they came.

Before means

a. many years ago	<input checked="" type="radio"/> Yes	No
b. a year ago	Yes	No
c. they were not there	Yes	No
d. the last few years	Yes	No
e. one hundred one years ago	<input checked="" type="radio"/> Yes	No

35. Work will soon start on the Fort McMurray oil sands plant. Work will start on the oil sands plant in 1964.

Soon means

a. in ten days	Yes	No
b. work will start	Yes	No
c. in a few years	Yes	No
d. many years ago	<input checked="" type="radio"/> Yes	No
e. eleven years ago	<input checked="" type="radio"/> Yes	No

36. The CN Tower Building opened in 1966. Train passengers bought tickets there when the building opened.

When means

a. several years ago	<input checked="" type="radio"/> Yes	No
b. nine years ago	<input checked="" type="radio"/> Yes	No
c. a few months ago	Yes	No
d. the building opened	Yes	No
e. six years ago	Yes	No

37. In September, 1971, Sally was learning how to print. She held the pencil carefully as she learned to print.

As means

a. last month	Yes	No
b. a few months ago	Yes	No
c. a few years ago	Yes	No
d. four years ago	Yes	No
e. she learned to print	Yes	No

38. Mr. William Hawrelak was chosen Mayor of Edmonton on October 16, 1974. Many people chose him when they went to vote.

When means

a. the present day	Yes	No
b. a year ago	Yes	No
c. many months ago	Yes	No
d. they went to vote	Yes	No
e. in a few days	Yes	No

APPENDIX H
DESCRIPTION OF PILOT STUDY STUDENT SAMPLE

Table B

Age of Pilot Study Student Sample
in Years and Months

Age in Years, Months	No. of Males	No. of Females	Total No. of Students
9 - 2	0	1	1
9 - 3	3	0	3
9 - 4	3	2	5
9 - 5	0	0	0
9 - 6	3	0	3
9 - 7	4	0	4
9 - 8	0	3	3
9 - 9	3	0	3
9 - 10	1	3	4
9 - 11	0	2	2
10 - 0	0	1	1
10 - 1	3	0	3
10 - 2	2	3	5
10 - 3	0	0	0
10 - 4	0	0	0
10 - 5	0	0	0
10 - 6	0	1	1
10 - 7	1	0	1
Total	23	16	39

Table C
Verbal and Nonverbal Intelligence Quotient Range
of Pilot Study Student Sample

I.Q. Score Range	Verbal						Nonverbal					
	Males			Females			Males			Females		
	No.	%	No.	%	Total Students	No.	%	No.	%	Total Students	No.	%
80 - 89	5	21.8	1	6.3	6	1	4.4	2	12.5			3
90 - 99	3	13.0	2	12.5	5	3	13.0	4	25.0			7
100 - 109	6	26.1	3	18.8	9	7	30.4	2	12.5			9
110 - 119	3	13.0	2	12.5	5	4	17.4	3	18.8			7
120 - 129	4	17.4	6	37.5	10	7	30.4	3	18.8			10
130 - 139	2	8.7	1	6.3	3	1	4.4	2	12.5			3
140+	0	0.0	1	6.3	1	0	0.0	0	0.0			0
Total	23	100.0	16	100.2	39	23	100.0	16	100.1			39

Note. Student intelligence was measured by the Canadian Lorge-Thorndike Intelligence Test, Form 1, Level A.

Table D

Word Meaning and Paragraph Meaning Percentile Range
of Pilot Study Student Sample

Percentile Range	Word Meaning				Paragraph Meaning				Total Students
	Males		Females		Males		Females		
	No.	%	No.	%	Total Students	No.	%	No.	%
0 - 9	6	26.1	0	0.0	6	4	17.4	0	0.0
10 - 19	0	0.0	4	25.0	4	1	4.3	2	12.5
20 - 29	2	8.7	0	0.0	2	2	8.7	3	18.8
30 - 39	2	8.7	1	6.3	3	5	21.8	3	18.8
40 - 49	6	26.1	3	18.8	9	3	13.0	2	12.5
50 - 59	1	4.3	0	0.0	1	4	17.4	1	6.3
60 - 69	0	0.0	2	12.5	2	0	0.0	1	6.3
70 - 79	4	17.4	4	25.0	8	2	8.7	1	6.3
80 - 89	0	0.0	1	6.3	1	2	8.7	1	6.3
90 - 99	2	8.7	1	6.3	3	0	0.0	2	12.5
Total	23	100.0	16	100.2	39	23	100.0	16	100.3
									39

Note. Student Word Meaning and Paragraph Meaning percentiles were derived from performance on the Stanford Achievement Test, Form X, Intermediate 1.

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